AMERICAN SOCIETY FOR TESTING MATERIALS

BULLETIN

260 SOUTH BROAD STREET PHILADELPHIA, PA.

"Promotion of Knowledge of Materials of Engineering and Standardization of Specifications and Methods of Testing"

Number 82 October 31, 1936

Twentieth Anniversary of Corrosion Tests

Occasion Celebrated at Annapolis

THE Twentieth Anniversary of the A.S.T.M. atmospheric corrosion tests on black iron and steel sheets which were exposed at Annapolis, Md., on October 17, 1916, was celebrated on Friday, October 16, at a banquet held at Carvel Hall, Annapolis. Some of the men who constituted the original A.S.T.M. committee in charge of this long-time test program and a number of others now active in the inspection and several invited guests were present.

The celebration was arranged by a special committee consisting of R. F. Passano, The American Rolling Mill Co., and E. S. Taylerson, Carnegie-Illinois Steel Corp.

Since the specimens were put on the test racks, they have been faithfully inspected twice a year by a special subcommittee of A.S.T.M. Committee A-5 on Corrosion of Iron and Steel.

The original series of tests started in 1916 included identical sets of test specimens exposed to the industrial atmosphere of Pittsburgh, the rural and light industrial atmosphere at Fort Sheridan, Ill., and sea-coast type of atmosphere at Annapolis. About 485 specimens of No. 22 and No. 16 gage sheets were exposed at each location. The Pittsburgh tests extended over a period of six years and three months, during which a large number of failures developed in the specimens. The Fort Sheridan tests covered a period of eleven years in which 127 of the 219 specimens of No. 22 gage failed and four of the 260 No. 16 gage specimens. At Annapolis there have been no failures reported on the No. 16 gage specimens, but about 60 of the No. 22 gage have failed.

The chief feature of the selection of the specimens used in the tests was that some of the samples contained added copper and a comparable number were non-copper-bearing or had low-copper content. The experiments demonstrated quite conclusively that steel sheets containing up to about two tenths per cent copper offer a distinct increase to resistance to atmospheric corrosion as compared with sheets with little or no copper when they are both exposed freely to the atmosphere.

As a result of information developed in these tests, various American industries have benefited greatly from the use of the so-called copper-bearing steel. For instance, in the railroad field the life of the plate parts of hopper cars in normal service has been increased four to five years by the use of copper-bearing steel instead of the ordinary steel.

These atmospheric experiments have shown the value of phosphorus as an alloying element, although this observation has not been so widely circulated as was the information on copper. Phosphorus and copper together in steel produce more resistance to atmospheric corrosion than does copper alone.

Not only did these experiments shed light on the efficacy of small additions of copper to steels, but they undoubtedly stimulated research into the use of higher percentages of copper as an alloying element. Within the past two years a number of so-called high-strength steels have been introduced in the market containing appreciable amounts of both copper and phosphorus.[1]

ORIGINAL COMMITTEE MEMBERS PRESENT

Two of the members of the original inspection committee were present at the dinner, Messrs. W. R. Fleming, Metallurgical Engineer, The Andrews Steel Co., and M. E. McDonnell, Chief Chemist, The Pennsylvania Railroad Co. H. E. Smith, the other living member of the committee, was not able to be present and a message from him was read at the dinner. It is extremely interesting to note that the reason Mr. Smith could not be there was because he is engaged in assembling the large number of specimens which are to be exposed in the wire test program and is supervising the erection of the test racks at the various test sites. Reference is made to this new test program of Committee A-5 below, and it is planned to include in the near future an article describing this extensive program in detail.

Of the original committee on the construction of the test racks in this program, W. R. Fleming is the only surviving member. Dr. F. N. Speller, the National Tube Co., who was present at the first inspection group (see accompanying photograph) and who has taken an active interest in this test program and in numerous other phases of Committee A-5 work, was also present.

It is significant that after so long a period of time these men should still be active in the work. Their interest and support not only is evidence of the importance of the work, but is also a tribute to the inspiration given by the late J. H. Gibboney, former Chief Chemist, Norfolk & Western Railway Co., who was vice-chairman of Committee A-5 when the tests were initiated, and who served from 1922 until his death in 1933 as chairman of this committee. He was also chairman of the Inspection Committee from its organization until his death. E. S. Taylerson, Carnegie-Illinois Steel

[1] See Symposium on High-Strength Constructional Metals.

Group at First Inspection, April 27, 1917

In the following list, reading from left to right, the industrial connections of the men at time of the picture are given, followed by present connections, if known. An asterisk (*) indicates member of original Inspection Committee; a dagger (†), member of Construction Committee.

1. J. A. Aupperle, Metallurgical Engineer, American Rolling Mill Co.
2. M. Knowles.
3. F. N. Speller, Metallurgical Engineer, National Tube Co. Now Director, Department of Metallurgy and Research, National Tube Co.
4. J. H. Gibboney*† (deceased), Chief Chemist, Norfolk and Western Railway.
5. R. B. Carnahan, Jr. (deceased), Second Vice-President, American Rolling Mill Co.
6. G. A. Reinhardt, Metallurgist, Youngstown Sheet and Tube Co. Now Director of Metallurgy and Research, same company.
7. H. E. Smith,* Engineer of Tests, New York Central Railroad. Now Materials Engineer, White Plains, N. Y.
8. A. S. Cushman*† (deceased), Director, The Institute of Industrial Research.
9. Name not known—a representative of Whittaker-Glessner Co.
10. D. M. Buck*† (deceased), Metallurgical Engineer, American Sheet and Tin Plate Co.
11. F. B. Wheaton, U. S. A. Quartermaster's Corp.
12. W. A. Cooper*† (deceased), Superintendent, Alan Wood Iron and Steel Co.
13. T. W. Kincaid, Captain, U. S. Navy.
14. W. H. Walker, Professor of Industrial Chemistry, Massachusetts Institute of Technology.
15. S. S. Voorhees (deceased), Chemist, Bureau of Standards.
16. J. F. Daniels, Lieutenant-Commander, U. S. Navy.
17. W. R. Fleming,*† Chemist, Andrews Steel Co. Now Metallurgical Engineer, same company.
18. J. S. Unger, Manager, Central Research Laboratory, Carnegie Steel Co. (Recently retired just prior to his eightieth birthday.)
19. S. M. Rodgers, Metallurgist, American Steel and Wire Co.
20. M. E. McDonnell,* Chemist and Bacteriologist, Pennsylvania Railroad Co. Now Chief Chemist, same company.
21. D. J. McAdam, Jr., Metallurgist, U. S. Naval Experiment Station. Now Metallurgist, National Bureau of Standards.

Corp., is the present chairman of the inspection group. F. F. Farnsworth, Bell Telephone Laboratories, Inc., is the chairman of Committee A-5 and T. R. Galloway, The New York Edison Co., is secretary.

OTHER COMMITTEE A-5 TESTS

When the atmospheric corrosion tests on black iron and steel sheets were inaugurated, they were the sole responsibility of Committee A-5, but several extensive research projects were subsequently initiated and a number of extremely important investigations are now under way. One series of tests involved the resistance to corrosion of black iron and steel sheets in running water in which 900 samples were exposed to filtered drinking water, brackish water and acid-mine water. Six hundred specimens of sheets were tested in a program to determine the resistance to corrosion in seawater. In another program 540 specimens of zinc-coated iron and steel sheets were exposed at five committee test sites to various types of atmosphere and in an extremely extensive test investigation begun in January, 1929, a total of 700 hardware specimens carrying commercial metal protective coatings of zinc applied by various processes—cadmium, aluminum, lead, etc.—have been exposed at five test locations

The latest test program—among the most extensive of those sponsored by the Society—includes atmospheric corrosion tests of wire and wire products. In these tests involving plain unfabricated wire, barbed wire, strand, farm fence and chain-link fence, over 30,000 test specimens are being exposed at eleven test sites in widely separated parts of the United States. The specimens for these tests are now being assembled on the test racks.

Complete data and information on the various test programs sponsored by Committee A-5 have been given in the committee's annual reports and also discussed in technical papers presented at Society meetings. C. D. Hocker, in his paper on "Outdoor Test Results on Bare and Metal-Coated Ferrous Specimens," part of the Symposium on the Outdoor Weathering of Metals and Metallic Coatings, discusses the results of the committee tests, and in 1929, V. V. Kendall and E. S. Taylerson presented a paper on "A Critical Study of the A.S.T.M. Corrosion Data on Uncoated Commercial Iron and Steel Sheets."

The Anniversary Dinner was of an informal nature and no addresses were given. Some of the men active in the work for so long gave reminiscences of the early work and the significance of the test program was commented on. There was due regard to the sentiment of the

Group at Inspection, October 16, 1936

An asterisk indicates member of present Inspection Committee. Reading from left to right, first row—M. E. McDonnell,* W. R. Fleming;* second row—E. E. Thum, Editor, *Metal Progress;* E. S. Taylerson;* H. S. Rawdon, Chief, Division of Metallurgy, National Bureau of Standards; T. R. Galloway, Secretary, Committee A-5, New York Edison Co.; R. F. Passano;* third row—President A. C. Fieldner; Secretary-Treasurer Warwick; Laurence Thompson, U. S. Naval Engineering Experiment Station;* C. P. Larrabee, Carnegie-Illinois Steel Corp.

occasion hand in hand with appreciation of the technical and historical value of the tests. Appreciation was expressed for the close cooperation of the U. S. Navy Dept. in making the Annapolis test site available at the U. S. Naval Engineering Experiment Station.

The Annapolis tests are unique in that they are believed to be the longest series of corrosion tests of sheets where a complete history of the specimens on the racks is available. It was indicated at the dinner that while extremely valuable data have been developed from the tests during the 20 years of their duration, it is hoped that the tests may be permitted to continue. The committee plans to continue its biennial inspections and the data which are developed will continue to be extremely interesting and of much value.

This Twentieth Anniversary of the outdoor exposure tests on sheets at Annapolis serves to emphasize that probably in no other way except through a program such as that sponsored by the Society does industry have access to facilities for conducting outdoor exposure tests over this long period of years with the same competent and unbiased supervision. Through inspections and the publication of corrosion data in convenient form it is felt that the Society has made a distinct contribution to the field of useful engineering information relating to the performance of various metals and in so doing it is carrying out one of its primary purposes, namely, the promotion of knowledge of the materials of engineering.

New Tentative Specifications and Revisions Approved by Standards Committee

At its meeting on August 26 at A.S.T.M. Headquarters, Committee E-10 on Standards accepted for publication as tentative 13 proposed new standards recommended by certain standing committees, approved proposed revisions in 13 existing tentative standards and acted to approve for publication proposed revisions in one standard. These actions by the Standards Committee were in accordance with the provision of the By-laws which empowers it in the interval between annual meetings to determine whether the requirements relating to the preparation and submission of standards have been complied with and whether the respective standing committees have reached a substantial consensus in their recommendations to the Society. If these conditions are met, Committee E-10 can approve new tentative standards and tentative revisions of existing specifications and tests.

Of the actions enumerated in the list given below, which also indicates the standing committees in charge of the respective items, all were approved at the E-10 meeting, except the new tentative specifications for 20 per cent Chromium, 9 per cent Nickel Alloy Steel Castings (A 198 - 36 T) which were approved by letter action on October 14.

Several of the new tentative standards are the culmination of intensive committee work extending over many months. They will meet persistent demands from various industries for standardized specification requirements.

All of the new specifications and tests, and revisions will be published in the 1936 *Proceedings*, Part I, and also in the 1936 Book of A.S.T.M. Tentative Standards. As with all of the A.S.T.M. specifications, whether tentative or standard, they will also be available in separate form and can be ordered in quantity at reduced prices.

Including the new items listed below, there are now 283 tentative standards and 513 standards, a total of 796. Five years ago the total was 623 and in 1926, 497.

New Tentative Standards

Tentative Specifications for:

- High-Strength Structural Rivet Steel (A 195 - 36 T) *Committee A-1 on Steel*
- Seamless Steel Boiler Tubes for High-Pressure Service (A 192 - 36 T) *Committee A-1*
- Alloy-Steel Bolting Materials for High Pressure and Temperatures to 1100 F. (A 193 - 36 T) *Committee A-1*
- Nuts Used in Bolting for High-Pressure Service at Temperatures up to 1100 F. (A 194 - 36 T) *Committee A-1*
- Cupola Malleable Iron (A 197 - 36 T) *Committee A-7 on Malleable Iron Castings*
- 20 per cent Chromium, 9 per cent Nickel Alloy Steel Castings (A 198 - 36 T) *Committee A-10 on Iron-Chromium, Iron-Chromium-Nickel and Related Alloys*
- Aluminum-Base Alloy Permanent Mold Castings (B 108 - 36 T) *Committee B-7 on Light Metals and Alloys*
- Glazed Building Units (C 126 - 36 T) *Committee C-3 on Brick*

Tentative Methods of:

- Chemical Analysis of Steel, Cast Iron, Open-Hearth Iron and Wrought Iron (E 30 - 36 T) *Committee E-3 on Chemical Analysis of Metals*
- Test for Specific Gravity and Absorption of Coarse Aggregate (C 127 - 36 T) *Committee C-9 on Concrete and Concrete Aggregates and Committee D-4 on Road and Paving Materials*
- Test for Specific Gravity and Absorption of Fine Aggregate (C 128 - 36 T) *Committee C-9 and Committee D-4*
- Test for Softening Point by Ring-and-Ball Apparatus (E 28 - 36 T) *Committee E-1 on Methods of Testing*

Tentative Definitions of:

- Terms Relating to Cast Iron (A 196 - 36 T) *Committee A-3 on Cast Iron*

Revisions in Existing Tentative Standards

Tentative Specifications for:

- Wrought-Iron Plates (A 42 - 36 T)
- Copper-Silicon Alloy Plates and Sheets (B 96 - 36 T)
- Sheet Copper-Silicon Alloy (B 97 - 36 T)
- Copper-Silicon Alloy Rods, Bars and Shapes (B 98 - 36 T)
- Copper-Silicon Alloy Wire for General Purposes (B 99 - 36 T)
- Aluminum-Base Alloy Sand Castings (B 26 - 36 T)
- Building Brick (Made from Clay or Shale) (C 62 - 36 T)
- Insulated Wire and Cable: Class AO, 30 per cent Hevea Rubber Compound (D 27 - 36 T)
- Insulated Wire and Cable: Performance Rubber Compound (D 353 - 36 T)

Tentative Methods of:

- Testing Brick (Modulus of Rupture, Compressive Strength, Absorption) (C 67 - 36 T)
- Testing Varnishes Used for Electrical Insulation (D 115 - 36 T)
- Testing Sheet, Tape, and Molded Insulating Materials for Dielectric Strength (D 149 - 36 T)

Tentative Definitions of:

- Terms Relating to Petroleum (D 288 - 36 T)

Tentative Revision of Standard Method

Standard Methods of:

- Testing Molded Materials Used for Electrical Insulation (D 48 - 33)

Some Old Materials for Modern Uses

by Jordan A. Pugh[1]

EDITOR'S NOTE.—This paper can be considered, in one sense, a sequel to the address presented at the 1935 Annual Meeting in Detroit by J. E. Burchard on the subject "The Role of Materials in Modern Housing." Materials discussed included wood, concrete, metals, synthetics, glass, stone and brick. It may be pertinent to record that one definition of the word "sequel" is "a resumption of something not yet ended."

As a preface to this paper it may not be amiss to quote

> "Nothing is changeless save change" and "Progress entails change—but change does not necessarily entail progress."

So since there is being displayed at this time an acute interest in new architectural forms and in the adaptation to such forms of various materials hitherto not used extensively for structural purposes, it might be wise for the engineering and architectural professions and the construction industry in general not to discard accepted practices and materials for innovations, until the merits of these are decided with some reasonable degree of certainty.

The fact that wood, stone and burned clay products have been used for thousands of years in the construction of buildings of all types is, of course, no guarantee that science will never develop satisfactory substitutes. In more recent times steel and concrete have both achieved definite places. Most of us have personal knowledge of industrial changes which have practically wiped out whole industries in existence for hundreds of years, and those who have no personal knowledge of such changes have at any rate read of them.

On the other hand, anyone experienced in the history of the construction industry has from time to time seen this or that material developed, advertised, and used, at times by competent builders, only to find that the material or the method had inherent defects which only time could develop.

The A.S.T.M. has never assumed the role of an oracle, and it is no function of the Society to predict the future of new, or of old materials under constantly changing customs and practices. The Society can, and does develop sound standards for appraising certain qualities of materials and must, and does, stop there. But it is a matter of real concern to the individual members of the Society to acquaint themselves with the merits of the new as well as of the older materials. Failure to appraise correctly such merits and the proper use of such materials may well result in a blow to the reputations of the architect, engineer, contractor and manufacturer, and a financial loss to the owner.

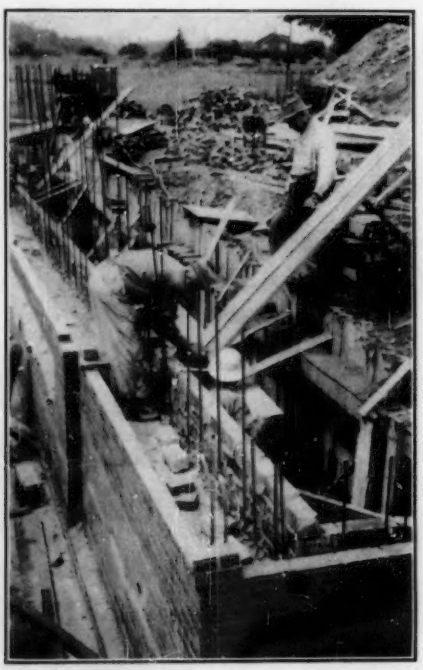
The engineering and architectural professions have developed certain standards for certain materials, based on use requirements; and the result has been sound structures satisfactory to all concerned.

It is a matter of general agreement that there exists today a shortage of dwellings, especially those in the zone of lower costs, so naturally there is an active interest in ascertaining the best methods of correcting this condition.

It has been remarked that "with the aid of can openers, Americans have learned to live out of cans and perhaps they may be induced to live in cans." While this somewhat humorous comment does suggest possibilities, it also insinuates doubt as to the extent to which such an individual possession as a home may be reduced to a uniform factory pattern for the sake of achieving mass production economies. Possible? Perhaps. Probable? Not proven.

Burned clay products happen to be one of the oldest of man-made materials. It is no mere accident that clay bricks are made today in practically the same dimensions and shapes in which they were first formed. These sizes and propor-

[1] General Manager, Structural Clay Products, Inc., Washington, D. C.



Left: Construction of Reinforced Brick Abutment.

Right: Reinforced Brick Masonry in Bridg

tions are those which experience has shown to be satisfactory visually from an architectural standpoint, and to effect actual construction soundly, and economically from the standpoint of labor and material costs. The units can be manipulated to meet almost any architectural or engineering design and can be made in various shapes and worked into intricate architectural patterns while still functioning as structural members. In more recent years manufacturers have developed new colors, textures and finishes of a wide and pleasing variety. Very beautiful sculptured effects have been produced by sand blasting or cutting ornamental panels or friezes in the face of brick masonry. Also, bricks are made with a large percentage of voids (practically in the form of small tiles of approximately twice the size of an ordinary brick).

Within the last few years machinery manufacturers have developed what is known as the de-airing process. This consists in passing the clay through a vacuum chamber, the result being a clay column from which most of the air has been eliminated, thus making a plastic mass of great strength and of unusual flexibility and density.

Reinforced brick masonry, now familiarly known as "R.B.M.," actually antedates reinforced concrete. Its principle was discovered over one hundred years ago by Marc Brunel, once chief engineer of the City of New York and later knighted by Queen Victoria in recognition of his services in constructing the Thames River tunnel, in part of which structure "R.B.M." was actually used.

"R.B.M." design principles are the same as those commonly accepted for reinforced concrete design and identical formulas may be used. As no forming is required, the use of "R.B.M." frequently results in economy. There was displayed at the Century of Progress Exposition in Chicago a house constructed with prefabricated reinforced brick panels. Such panels could have been constructed at the factory or on the site and in this particular case were easily placed in position by small derricks.

There has recently been developed a new form of structural clay tile, so designed that reinforcing steel may be easily placed in open channels provided for the purpose, making it entirely practical and economical to prefabricate reinforced tile beams.

Structural clay tile under improved processes of manufacture is now made in lighter weights, of greater strength, and some are even shaped so that the mason is afforded a handfold by which the unit may be easily and accurately placed. Many structural tile are made with a wide range of colors and with textures permitting their use in exterior walls.

Another marked advance in the brick maker's art has been the development of the enamel, ceramic glaze and salt glaze lines. Quality ware is being produced; ware that will withstand the most exhaustive tests and extreme weathering conditions with a permanence that endures for many decades without peeling or discoloration. The colors are permanent, including white, cream, ivory, gray, green, blue, brown, black, yellow, red and buffs. Units are made in the regular sizes and in many needed special shapes.

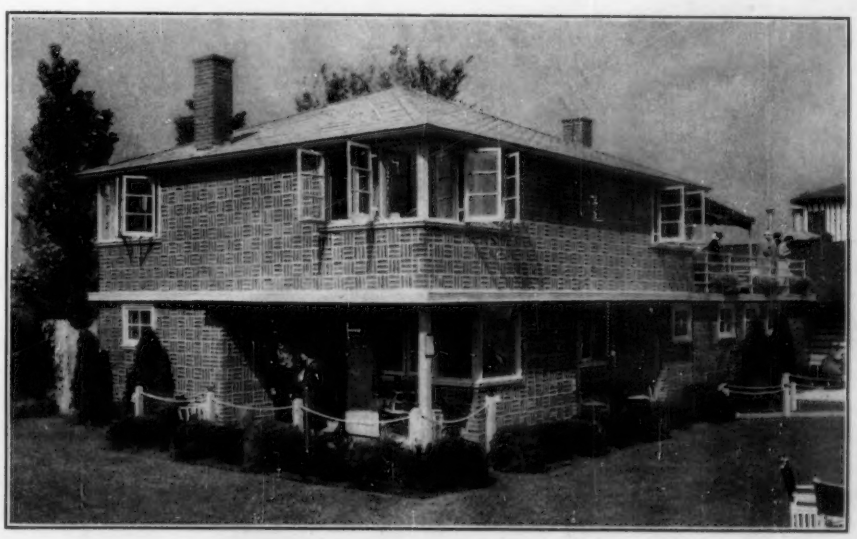
Paving brick, most of which is now made by the de-aired process, are heat treated to insipient vitrification, giving them a strength and hardness which makes them peculiarly adapted for service in highways and in sewers carrying detritus at high velocities. More recent manufacturing developments including side and end lugs which provide automatic spacing and the development of new types of long-lived flexible fillers have resulted in smooth anti-skid surfaces which at the same time provide for expansion and contraction without a disruption of the surface.

At the same time, many architects continue to prefer the old forms, especially of bricks, and as beauty continues to be a distinct factor of value, the time certainly has not yet come (if indeed it ever does) when owners, designers and engineers can safely disregard burned clay products, certainly not until strength, permanence, fire safety, economy and beauty are no longer regarded as elements of sound construction.

Naturally, architectural and engineering professions are both manifesting keen interest in air conditioning, heating, cooling and lighting. Manufacturers of lighting equipment maintain that scientific lighting (which has a constant value) may well be preferred to natural light which varies with the seasons, the hour and the weather. In recent years several buildings have been erected with walls containing no openings. These buildings have been lighted by electricity, and as walls without openings naturally have better insulating value they thus afford more effective results from air conditioning, heating and cooling equipment.

The automobile has made American life rather migratory and in many families the soda fountain has displaced the old family dinner table, but we may well doubt whether the home will ever become merely "a machine for living" or whether it will ever generally be considered merely as a place of departure rather than a place to which to return.

The up-turn in construction is proceeding apace. Architects, engineers, manufacturers and builders should study carefully all types of construction to the end that the public may be provided the best and safest housing at the lowest possible price. It may be observed that practically all construction is at this time being done with the customary materials but with a clearer apprehension of good planning.



Monolithic Face Brick Reinforced Panel House

Annual Meeting and Exhibit in New York

THE Society's Fortieth Annual Meeting will be held from Monday, June 28 to Friday, July 2, inclusive, at The Waldorf-Astoria, New York City. A number of topics have been suggested for inclusion on the meeting's technical program and Committee E-6 on Papers and Publications at its meetings on November 2 and in February will develop the program.

The New York District Committee which is to be enlarged to consist of a committee on arrangements for the 1937 annual meeting is forming a number of subcommittees to take charge of features of the meeting, following somewhat the successful plan in effect for the Detroit meeting in 1935.

The Fourth Exhibit of Testing Apparatus and Related Equipment will be held in conjunction with the meeting and a detailed announcement of the Exhibit has recently been mailed to a number of companies in the apparatus field who may be interested in sponsoring booth displays. A number of applications for space have already been received. It is planned that one of the features of the Exhibit will be displays, sponsored by A.S.T.M. standing committees, of special apparatus which they have developed, illustrations of test work under way, etc.

Highway Research Board Meeting

THE Sixteenth Annual Meeting of the Highway Research Board will be held in Washington, D. C., during the week of November 16, according to announcement made by Roy W. Crum, Director of the Board. Tuesday and Wednesday, November 17 and 18, will feature open meetings of Departments of the Board for informal discussion of current highway problems. The regular annual Board meeting will be held on Thursday and Friday, November 19 and 20. Meetings will be held in the building of the National Academy of Sciences and National Research Council.

Owing to the realization of the important role of soil in road work an interesting program has been arranged by the Soils Investigations Department—an informal open meeting all day Tuesday; a symposium on stabilized soil for roads on Friday afternoon, and several important committee reports. Another topic of growing interest is that of roadside development. In addition to several reports there will be an open meeting on Wednesday afternoon for the informal discussion of roadside problems.

Offers of Papers for 1937 Meeting

COMMITTEE E-6 on Papers and Publications which will develop the program for the 1937 Annual Meeting at The Waldorf-Astoria, New York City, is desirous that members of the Society and others who have in mind submitting offers of technical papers should send these offers to A.S.T.M. Headquarters well in advance of the February meeting of the committee. All offers must be accompanied by a summary which should make clear the intended scope of the paper and indicate features that in the opinion of the author will justify its inclusion in the annual meeting program. Suitable blanks to be used in transmitting the necessary information will be sent promptly on application to the Society Headquarters.

NEW YORK

The World's Greatest Market Place

1524—Giovanni de Verrazano, Florentine Navigator, first European to visit site of city—he entered the Lower Bay.

1609—Henry Hudson entered the Narrows—sailed up the river bearing his name.

1626—Peter Minuit, Director General of New Netherland, bought Manhattan from the Indians for 60 guilders, or $24. Population, 200.

1653—New Amsterdam incorporated as a city—first in America. Population, 800.

1664—English took possession of city on September 8—named New York.

1690—First inter-colonial congress held there.

1732—Boston stage—monthly (two weeks each way).

1756—Philadelphia stage, taking "three days through only" began running.

1765—Stamp Act Congress held there.

1776—British captured city on September 14.

1783—Americans again took control on November 25 (Evacuation Day).

(More "non-chronological" facts in next BULLETIN)

THE WALDORF-ASTORIA

World's Largest Hotel

1893—Old Waldorf opened.

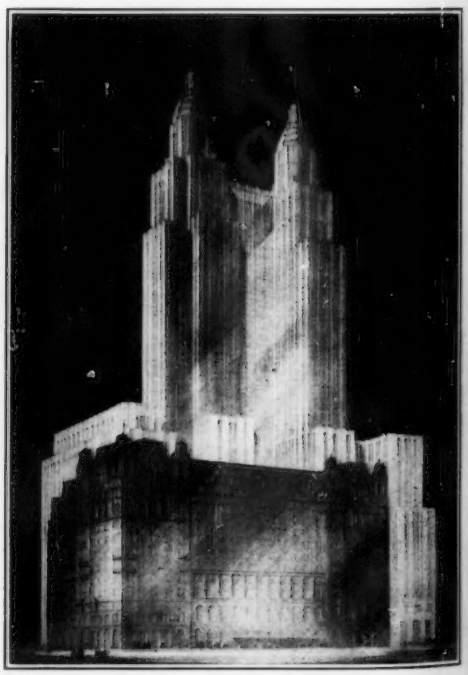
1929—Old Waldorf closed in May.

1931—New Waldorf opened.

The new Waldorf-Astoria building covers 81,337 sq. ft. or 11,862 sq. ft. more than the old building. The new building is 200 ft. 10 in. in width and 405 ft. long. It has 47 stories, with twin towers reaching a height of 625 ft. 7 in.

The substructure of the present building required 2000 tons of steel; 25,000 tons were used in the superstructure.

More than 3000 cubic feet of cut Swenson pink granite were used in the base; in the main hotel shaft, more than 80,000 cu. ft. of Indiana limestone were required. Face bricks to harmonize with the limestone were especially made—3,000,000 of them. Eight million ordinary bricks went into the building.



The Old Waldorf Superimposed on the New

New Standards Issued for Construction Materials

A NUMBER of the specifications and tests formally adopted this year as A.S.T.M. standards and many of the proposed standards issued as tentative specifications and tentative methods of testing cover construction materials in wide usage, in such structures as buildings, dams, highways, pipe lines and similar structures and projects.

Emphasis is being placed continually on the desirability and importance of using materials of a specified quality and the increasing use by architects, designing and construction engineers, building code officials, etc., of recognized standard specification requirements is significant of the trend. The wider use of A.S.T.M. standards is evidence of increasing recognition of their value and utility. The rigorous procedure of the Society in developing a standard, in the preparation of which the consumer, producer and specialist have a voice, is assurance of practical and authoritative requirements. No standard can come into wide usage unless it is mutually satisfactory to the maker of the material and the consumer.

The following list of new standards should be of particular interest to those directly concerned with construction projects, including building code officials, contractors, engineers, designers, materials engineers and others.

STANDARD SPECIFICATIONS ADOPTED IN 1936

(These have been previously published as tentative)

METALLIC MATERIALS

Standard Specifications for:

- Axle-Steel Concrete Reinforcement Bars (A 160 - 36)
- Alloy-Steel Castings for Structural Purposes (A 148 - 36)
- Welded and Seamless Steel Pipe (A 53 - 36)
- Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Ordinary Uses (A 120 - 36)
- Zinc-Coated (Galvanized) Wrought-Iron Sheets (A 163 - 36)
- Bare-Stranded Copper Cable: Hard, Medium-Hard or Soft (B 8 - 36)

Standard Methods of:

- Test for Absorption and Apparent Specific Gravity of Natural Building Stone (C 97 - 36)
- Flexure Testing of Natural Building Stone (Determination of Modulus of Rupture) (C 99 - 36)
- Test for Modulus of Elasticity of Natural Building Stone (C 100 - 36)
- Shear Testing of Natural Building Stone (C 102 - 36)
- Sampling and Testing Structural Clay Tile (C 112 - 36)
- Panel Test for Resistance of Refractory Brick to Thermal and Structural Spalling (C 38 - 36)
- Panel Test for Resistance to Thermal and Structural Spalling of High Heat Duty Fireclay Brick (C 107 - 36)

NON-METALLIC MATERIALS

Standard Specifications for:

- High-Early-Strength Portland Cement (C 74 - 36)
- Load-Bearing Concrete Masonry Units (C 90 - 36)
- Structural Clay Floor Tile (C 57 - 36)
- Structural Clay Non-Load-Bearing Tile (C 56 - 36)
- Structural Clay Load-Bearing Wall Tile (C 34 - 36)

NEW TENTATIVE SPECIFICATIONS

(Approved in 1936. Certain of these were issued previously but were extensively revised this year)

METALLIC MATERIALS

Tentative Specifications for:

- Structural Nickel Steel (A 8 - 36 T)
- High-Strength Structural Rivet Steel (A 195 - 36 T)
- Fabricated Steel Bar or Rod Mats for Concrete Reinforcement (A 184 - 36 T)
- Welded Steel Wire Fabric for Concrete Reinforcement (A 185 - 36 T)
- Carbon-Steel Castings for Miscellaneous Industrial Uses (A 27 - 36 T)
- Single and Double Refined Wrought-Iron Bars (A 189 - 36 T)
- Wrought-Iron Plates (A 42 - 36 T)
- Lightweight Thin-Sectioned Gray-Iron Castings (A 190 - 36 T)
- Cupola Malleable Iron (A 197 - 36 T)
- Magnesium-Base Alloy Bars, Rods and Shapes (B 107 - 36 T)
- Bronze Castings for Turntables and Movable Bridges (B 22 - 36 T)
- Sheet and Strip Phosphor Bronze (B 103 - 36 T)
- Copper-Silicon Alloy Wire for General Purposes (B 99 - 36 T)
- Copper-Silicon Alloy Plates and Sheets (B 96 - 36 T)
- Copper-Silicon Alloy Rods, Bars and Shapes (B 98 - 36 T)
- Sheet Copper-Silicon Alloy (B 97 - 36 T)

Tentative Methods of:

- Test for Uniformity of Coating by the Preece Test (Copper Sulfate Dip) on Zinc-Coated (Galvanized) Iron or Steel Wire (A 191 - 36 T)

NON-METALLIC MATERIALS

Tentative Specifications for:

- Sand for Use in Plaster (C 35 - 36 T)
- Building Brick (Made from Clay or Shale) (C 62 - 36 T)
- Glazed Building Units (C 126 - 36 T)
- Structural Wood Joist and Planks, Beams and Stringers, and Posts and Timbers (D 245 - 36 T)
- Zinc Chloride (D 432 - 36 T)

Tentative Methods of:

- Testing Brick (Modulus of Rupture, Compressive Strength, Absorption) (C 67 - 36 T)
- Panel Test for Resistance to Thermal and Structural Spalling of Super Duty Fireclay Brick (C 122 - 36 T)
- Test for Coal and Lignite in Sand (C 123 - 36 T)
- Making Flexure Tests of Concrete Using a Simple Beam with Third Point Loading (C 78 - 36 T)
- Test for Flow of Portland-Cement Concrete by Use of the Flow Table (C 124 - 36 T)
- Test for Specific Gravity and Absorption of Coarse Aggregate (C 127 - 36 T)
- Test for Specific Gravity and Absorption of Fine Aggregate (C 128 - 36 T)
- Test for Softening Point by Ring-and-Ball Apparatus (E 28 - 36 T)

List of Standards Available

THERE has recently been published a complete List of A.S.T.M. Standards and Tentative Standards in the form of a 32-page pamphlet. The standard and tentative A.S.T.M. specifications, test methods, definitions, etc., are given in the list under five main subdivisions according to the various committee classifications in the A, B, C, D and E groups. Standards in each classification are given according to the materials to which they apply, each group being subdivided under specifications, methods of testing, recommended practices and definitions. An alphabetical table of contents is of considerable assistance in locating standards on a specific subject. Copies of this list are available without charge and can be obtained on request from Society headquarters.

Second International Testing Congress

Sponsored by British Committee in London

At its first congress, held in Zurich in September, 1931, the International Association for Testing Materials accepted an invitation from the committee representing British members to hold the next congress in Great Britain, and recently the Permanent International Committee approved the suggestion that the congress be held in London, April 19 to 24, 1937.

The object of the congresses held by the I.A.T.M. is to obtain international cooperation in the study of materials and their testing, and to provide facilities for the exchange of views, experience and knowledge with regard to all matters connected with this subject. Participation in the congress will be open to all interested in the study of materials and their testing on payment of the membership fee.

The proceedings will be based on selected papers, which by invitation, have been contributed by leading authorities in their respective fields throughout the world. Most of these invitations have been issued and approximately 150 papers are already promised. Some 22 papers to be presented at the congress will be prepared by American authors—a list of the papers will be included in a later issue of the Bulletin. Arrangements for solicitation of the papers and other matters in connection with American participation are being directed by W. H. Fulweiler, representative on the I.A.T.M. Permanent Committee.

The organization of the congress has been undertaken by a Congress Organizing and Reception Committee, which consists of the British I.A.T.M. Committee and representatives of many leading British institutions. This committee is investigating hotel and housing facilities, since the congress will be held during the ceremonies of the coronation of the British King, and further details will be furnished.

The subjects selected for discussion at the congress are divided into four groups dealing respectively with metals, inorganic materials, organic materials and subjects of general importance. The following subdivisions have been made:

Group A—Metals.—(1) Behavior of Metals (mechanical and chemical) as dependent upon temperature, particularly in regard to high temperatures; (2) Progress of Metallography; (3) Light Metals and their Alloys; (4) Wear and Machinability.

Group B—Inorganic Materials.—(1) Concrete and Reinforced Concrete; (2) Erosion and Corrosion of Natural and Artificial Stone; (3) Methods of Testing Ceramic Bodies.

Group C—Organic Materials.—(1) Textiles; (2) Wood Cellulose; (3) Timber Preservation; (4) Ageing of Organic Materials; (5) Colors and Varnishes.

Group D—Subjects of General Importance.—(1) Relation between the results of laboratory tests and behavior in use and service; (2) The bearing of recent advances in physics and chemistry on the knowledge of materials; (3) The properties of materials for the thermal and acoustic insulation of buildings.

A Congress Book will be issued, which will contain, in addition to the papers presented, an account of the proceedings, articles by each of the four Group Presidents, in which attention will be directed to the principal additions to knowledge recorded in the Papers and Discussions. The papers as presented will generally not exceed 1000 words each in length; such highly condensed summaries of important knowledge should be invaluable for reference purposes. Advance copies will be available to members of the congress. The papers will be printed in English, French or German, in which languages the proceedings of the congress will be mainly conducted.

In addition to the technical sessions of the congress, numerous visits to places of scientific and industrial interest will be arranged, as well as excursions and social functions, including a banquet, a dance and official receptions. Special arrangements will be made for the entertainment of ladies.

Detailed information about the congress, including membership fee, list of papers, price of the Congress Book, particulars of excursions, visits and social functions, etc., will be issued in due course. All requests for further information and inquiries should be addressed to the Honorary Secretary of the Congress, Mr. K. Headlam-Morley, at the offices of the British I.A.T.M. Committee, 28 Victoria St., London, S. W. 1. Sir Frank Smith, Secretary of the Royal Society of Great Britain and Secretary of the Department of Scientific and Industrial Research, is chairman of the Executive Committee on the Congress Organizing Committee, and Dr. H. J. Gough, Superintendent, Engineering Dept., National Physical Laboratory, is chairman of the British I.A.T.M. Committee.

New Book on Engineering Alloys

A new publication on "Engineering Alloys—Names, Properties, Uses" has been prepared by Dr. N. E. Woldman, and A. J. Dornblatt and published by the American Society for Metals. Members of the A.S.T.M. who wish to procure a copy of this comprehensive publication can order their copies directly from the A.S.T.M. Headquarters, 260 S. Broad St., Philadelphia. The book, which comprises 622 pages, in red cloth binding, is divided into seven sections as follows:

Section One—Alloy Index.—An alphabetical list with serial numbers, the latter used to locate data on a particular alloy in Section Two. (88 pages.)

Section Two—Alloy Data.—Gives trade name, composition, properties, uses and key numbers designating the manufacturer and source of data. (306 pages.)

Section Three—Alloy Classification and Uses Index.—Classifies alloys according to special characteristics and typical uses. (52 pages.)

Section Three A—Advertisers.

Section Four—Directory of Manufacturers and Their Alloys.—Lists all manufacturers in alphabetical order and a summary of alloys in the book produced by each. (74 pages.)

Section Five—Key Index to Manufacturers.—Serial listing of all manufacturers and their agents referred to in Section Two. (16 pages.)

Section Six—Bibliography and References. (6 pages.)

Section Seven—Useful Data Appendix.—Includes conversion tables, definitions of terms and other helpful information about metals and alloys. Also gives classification of corrosion and heat-resistant alloys according to compositions. (26 pages.)

"Between the two covers there is collected a surprisingly large amount of information covering practically every commercial alloy, its trade name, chemical composition, its manufacturers and what they say it will do and what it is good for."

Copies of the publication can be obtained from A.S.T.M. Headquarters at $10 each.

Meeting of Northern California Members

MEMBERS of the Society in the Northern California District participated in a combined dinner meeting on September 17 with the Purchasing Agents' Association of Northern California. R. N. Jacobson, President of the Purchasing Agents and Frank M. Harris, chairman of the A.S.T.M. District Committee presided jointly. The general subject of the meeting was "Welding."

For the information of the purchasing agents, J. B. Terry, Chief Chemist, Standard Oil Co. of California, spoke first on "The Development of an A.S.T.M. Standard." From his experience in the petroleum field he outlined the procedure taken by a specification through its initial stages, its acceptance and enforcement by the industry concerned, its approval by the Society and finally its submission if appropriate to the American Standards Assn. for approval as American Standard. Mr. Terry's paper was followed by discussion and a number of questions, indicating the interest of the purchasing agents in the origin of the standards to which they so constantly refer.

NORTHERN CALIFORNIA DISTRICT COMMITTEE OFFICERS

Chairman F. M. Harris — *Secretary* Theo. P. Dresser

Turning specifically to the subject of the evening, Prof. N. F. Ward, Department of Mechanical Engineering, University of California, gave an instructive summary of A.S.T.M. standards relating to welding materials. He spoke of the application of existing standards to various practical problems, and described the beneficial role which laboratory and field research had played and would continue to play in the standardization of welding materials and welding practice.

On behalf of the purchasing agents, R. H. Petillon, Western Pipe and Steel Co., spoke upon "Progress in Welding," particularly from the point of view of large diameter steel pipe and tanks. His talk was illustrated by welded steel samples of actual workmanship, which indicated most clearly the remarkable advancement in the art, during the past decade.

In addition the purchasing agents had arranged with manufacturers for an exhibit of the latest types of welding and cutting apparatus, with demonstrators to explain their operation and field of application.

The Northern California District Committee feels that joint meetings of this character place the Society and its objectives before those who should know of its work in a most helpful way. Similar joint meetings are being scheduled at suitable intervals with the local sections of the other national engineering societies.

Notes on District Committees

DURING the past year, the organization of the eight A.S.T.M. district committees under the charter for district committees has been completed. The committees have been active along various lines during the year and a number of interesting and very successful meetings have been sponsored in various cities where committees have been formed. These meetings have been reviewed in previous issues of the BULLETIN. During the coming year several of the committees plan to hold meetings and a number have definite programs under way in connection with other A.S.T.M. work.

The New York District Committee has been enlarged to form a Committee on Annual Meeting Arrangements. A number of subcommittees are being appointed to head up work in connection with the Society's Fortieth Annual Meeting at The Waldorf-Astoria in June. Further details concerning the committees and their plans will, of course, be announced in future BULLETINS.

The Philadelphia Committee at a recent meeting discussed its work and made preliminary plans for the holding of a symposium similar to the one on Industrial Fuels held last January. A series of papers dealing with the subject "Wear of Metals" is contemplated. Dr. G. H. Clamer, President and General Manager, The Ajax Metal Co., is chairman of the Symposium Committee. The District Committee is planning to stimulate membership work in the near future and will ask the assistance of A.S.T.M. members in the district.

The Chicago District Committee is making preliminary plans for the A.S.T.M. Regional Meeting and Committee Week which will be held at The Palmer House during the first week of March. Plans are being developed for joint meetings to be held in cooperation with other engineering societies in the Chicago district during the coming season, and work to stimulate the addition of new members in the district will be undertaken.

The Southern California group has tentatively agreed to sponsor a meeting in the fall and spring at which technical discussions will be presented on specific subjects. Special effort will be made to have in attendance representatives of local industries on the subject under discussion.

The Pittsburgh Committee plans to continue its active membership work and a meeting is contemplated at which technical papers and discussion will be given.

The Detroit District Committee has had a very active year and its work has resulted in a number of new A.S.T.M. members in the Detroit area. The committee plans a continuation of this work and other suggested activities will be studied.

The Cleveland Committee which sponsored the Symposium on Pearlitic Malleable Iron in February is developing a program for the coming year and details of this will be announced in future BULLETINS.

SPECIAL ATTENTION

Special attention is directed to the announcement in this BULLETIN that *all* items on the 1936 letter ballot on recommendations affecting A.S.T.M. standards were adopted.

A. S. T. M. BULLETIN

Published Bi-Monthly by

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Number 82 — October 31, 1936

Relation of Research to Standardization

NO COMMENT seems necessary concerning the extensive list of A.S.T.M. research projects appearing in this BULLETIN. The large number listed and their diversity bespeak the importance of the Society in promoting the knowledge of the materials of engineering. And satisfactory progress is being made in practically every project. The results to date have been published in *Proceedings,* and the data and information which will come forth in the future will be fully covered in Society publications.

In his message on "Why Use A.S.T.M. Standards," President Fieldner lists as one of the reasons, their competency, indicating that the standards result only after extended study and deliberation, oftentimes involving extensive experimental research. Adequate knowledge of materials underlies all basic specification work, for the more complete our knowledge, the more clearly can the specifications be written and the more valuable will be the standards that are set up.

In his book dealing with standards, N. F. Harriman[1] points out that "Scientific research finds its natural outlet in *standard data, standard materials, standard processes, or standard devices;* conversely, standardization finds in research its greatest contributor, yielding new and often incredible efficiencies. He points out that research is a vital factor in standardization, predominantly through seven lines of approach: (1) measuring the need to be met; (2) analysis of the factors adapted to meet the need; (3) fixing measured controls for producing specified quality; (4) basing such controls on correlation of fitness factors with service utility; (5) devising methods of test of quality for the producer and for the consumer; (6) analysis of service experience or simulated service to aid in improving the standard; (7) and most important of all, research fundamental to the pure sciences involved.

Research is broadly described as "an *appeal to the nature of things* and its findings must through standardization enter into the control of the processes of the industry to serve man.

"Standard industrial materials, processes and products, exist by thousands which owe their efficiency, even their existence, to scientific research. . . . Research takes service experience, analyzes it, and gives the data to the standardizing agencies, for use in revising the specification."

[1] N. F. Harriman, "Standards and Standardization," McGraw-Hill Book Co., Inc., New York City (1928).

Why Use A.S.T.M. Standards

A. S.T.M. specifications, definitions and methods of test should be used as standards for engineering materials because they are competent, unbiased, widely applicable, and authoritative.

They are *competent* because they are based on the best commercial practice, on adequate scientific research and on sound engineering judgment. Each standard is formulated and recommended by a standing committee composed of well-informed technologists on the subject in question. Their recommendations are made only after extended study and deliberation, oftentimes involving extensive experimental research on the part of commercial and scientific organizations connected with the committee membership.

A.S.T.M. standards are *unbiased* because each standing committee charged with the development or supervision of standards having a commercial bearing is made up of approximately equal representation of producing, consuming and general interests, the latter including engineering consultants, schools, independent research institutes, governmental technical agencies. Participation of general interest members insures the development of unbiased standards based on intrinsic merit rather than commercial expediency. At the same time, the producer and consumer representation see to it that the standards are practicable and that they supply a commercial need.

A.S.T.M. standards are *widely applicable* because they are formulated by committees whose members are carefully selected from all the different industries and technical groups which have occasion to use the standards. They are the result of a broad point of view over the entire field of engineering materials and are designed to serve as wide a variety of interests as possible without sacrificing the necessary detail for specific purposes.

A.S.T.M. standards are *authoritative* because they have behind them a great Society organized 34 years ago for the specific purpose of "The promotion of knowledge of the materials of engineering and the standardization of specifications and the methods of testing." The membership of the Society is a representative cross-section of the American engineering profession in all its branches. Its position, therefore, is supported not only by its own widespread membership, but also by its close relationship with technical societies and commercial associations through common membership. General recognition of these facts has placed the A.S.T.M. in an authoritative position with respect to standards for engineering materials.

A. C. Fieldner

President 1936-1937.

All Items on Letter Ballot Adopted

THE canvass, on September 1, of the 1936 Letter Ballot on Recommendations Affecting A.S.T.M. Standards showed that all items were adopted. The ballot covered recommendations to adopt as standard 67 existing specifications and test methods and the adoption as standard of revisions in 67 existing standards.

There were a total of 504 ballots cast. On many of the items the votes were all affirmative, and on numerous others, scattering negative votes were received. There was only one item, however, where more than ten negative votes were received, the adoption of the revised specifications for high-early-strength portland cement (135 affirmative, 12 negative), so that the requirement of a two-thirds approval of those voting, on each item, was met in all cases.

Because of the large number of items on the ballot, the full returns will not be published, but any member who desires a record of the voting on any item can obtain this from Society Headquarters.

HIGH-EARLY-STRENGTH CEMENT STANDARD

At the annual meeting Committee C-1 on Cement proposed certain revisions in the Tentative Specifications for High-Early-Strength Portland Cement, with the recommendation that they be accepted and the revised specifications adopted as A.S.T.M. standard. Because of the nature of these revisions the annual meeting, in referring them to letter ballot of the Society, added the stipulation that the proposal for testing cement containing additions provided in these revisions must be passed upon by the Executive Committee and found acceptable before the specifications could be officially declared A.S.T.M. standard.

At its October meeting the Executive Committee approved these specifications as revised with one minor editorial change. The complete revisions were given on page 20 of the *Summary of Proceedings* sent to each member with the July BULLETIN.

The Executive Committee is giving additional consideration to certain details in connection with methods of arranging for the tests and further announcements will be made. In the meantime, applications for tests may be addressed to Technical Assistant, Committee C-1, Cement Reference Laboratory, National Bureau of Standards, Washington, D. C.

1937 Regional Meeting in Chicago

AS PREVIOUSLY announced, the 1937 Regional Meeting of the Society is to be held at The Palmer House, Chicago, on Wednesday, March 3. Throughout the week beginning Monday, March 1, there will be in progress the Group Meetings of A.S.T.M. Committees.

The technical feature of the Regional Meeting is to be a Symposium on Motor Lubricants which is being arranged by a special committee of Committee D-2 on Petroleum Products and Lubricants headed by H. C. Mougey with other members of the Executive Committee of Technical Committee B on Motor Oils and with representatives from the Chicago District Committee. It is tentatively planned to have the symposium consist of papers dealing with such suggested topics as sludge, extreme pressure lubrication, oil consumption, lubrication as affected by newer bearing materials, etc.

Schedule of Meetings

DATE	COMMITTEE	PLACE
November 16	C-3 on Brick	Washington
November 16	D-18 on Soils for Engineering Purposes (Organization Meeting)	Washington
November 21	C-9 on Concrete and Concrete Aggregates	Washington
December 3	D-12 on Soaps and Detergents	New York City

Progress on Books of Standards

IN THE recent Circular to Members it was indicated that substantial progress is being made on the preparation of the 1936 edition of the Book of A.S.T.M. Standards. As in previous years, this will appear in two parts, Part I giving all standards on Metals; Part II, all of the A.S.T.M. standard specifications, tests, etc., relating to non-metallic materials. This widely used publication will aggregate a total of some 2500 pages and give in their latest form all of the 513 A.S.T.M. standards as of September 1, 1936. It is expected that copies of the book will be ready for distribution during the latter half of November.

The 1936 Book of A.S.T.M. Tentative Standards which contains all of the A.S.T.M. tentative specifications, test methods, definitions, etc., with the exception of those to appear in the compilation of "A.S.T.M. Methods of Chemical Analysis of Metals," as discussed below, will be distributed early in December. This publication will include 264 tentative standards aggregating some 1450 pages. The recent Members' Order Blank provided an opportunity for members to order copies of these publications at the members' price, $4.50, heavy paper cover; $5.50, cloth. The price of the book to non-members is $7, paper, and $8, cloth.

COMPILATION OF CHEMICAL TESTS FOR METALS

Somewhat of a departure from the previous policy of publishing A.S.T.M. standards and tentative standards has been decided upon this year through the issuance of the compilation of all A.S.T.M. methods of chemical analysis of metals in a separate publication. This book will include 19 methods of testing, aggregating some 275 pages. At the recent meeting of Committee E-10, the new tentative methods of analysis of steel, cast iron and wrought iron developed by Committee E-3 on Chemical Analysis of Metals were approved as tentative. At the same time 14 existing standards covering analytical methods for various non-ferrous metals and ferro-alloys were reverted to the status of tentative. This latter action was taken in view of the study that Committee E-3 is now making of all of the methods of chemical analysis. The committee expects to report changes or amplifications in some of them.

Each member of the Society can obtain a copy of this compilation without charge by request to A.S.T.M. headquarters. The regular type of heavy paper binding will be used, but members who wish a cloth bound copy can procure it for 50 cents. Extra copies can be purchased at $1.50 per copy in paper; $2 in cloth; non-members' prices are $2 and $2.50 respectively. The book will be distributed in December.

This publication is the only place where these 19 tentative methods of analysis of metals will appear.

Committee on Soils Organizing

ANNOUNCEMENT has been made in the Executive Committee Report and previous BULLETINS of the decision to organize a new A.S.T.M. standing committee on the subject of soils for engineering purposes. Progress has been made in the formation of this committee and it is anticipated that an organization meeting will be held shortly.

Under the direction of C. A. Hogentogler, Senior Highway Engineer, U. S. Bureau of Public Roads, and H. F. Clemmer, Engineer of Materials, District of Columbia, who were appointed by the Executive Committee as temporary chairman and secretary, respectively, of the committee, a Steering Committee has been appointed and is developing a suggested scope for the committee, an outline of subcommittee activities and is considering matters of personnel. This Steering Committee, under the chairmanship of W. S. Housel, Associate Professor of Civil Engineering, University of Michigan, includes the following members in addition to Messrs. Hogentogler and Clemmer, who are ex-officio members:

W. S. Housel, *Chairman*
Harold Allen, Kansas Highway Commission
D. M. Burmister, Columbia University
F. J. Converse, California Institute of Technology
A. E. Cummings, Raymond Concrete Pile Co.
T. L. Davey, Corps of Civil Engineers, U. S. Navy
A. T. Goldbeck, National Crushed Stone Assn.
F. L. Plummer, Case School of Applied Science

Some of the subjects on which subcommittees may be organized include the following: nomenclature and definitions; classification; methods of sampling; tests for the following: physical characteristics, stabilized soils, compressibility and elasticity, shearing resistance, and mechanical stability; load tests for bearing capacity of soils and of piles; tests for drainage characteristics; and specifications for soils.

Corrosion and Creep at A.S.M.E. Meeting

AS PART OF the annual meeting of the American Society of Mechanical Engineers to be held in New York City, November 30 to December 4, there will be held a Symposium on Corrosion-Resistant Metals in Design of Machinery and Equipment in three sessions on Thursday, December 3, and a session on Creep will be sponsored jointly by the Joint A.S.M.E.-A.S.T.M. Research Committee on Effect of Temperature on the Properties of Metals and the Applied Mechanics Division. This latter session, scheduled for Tuesday morning, will consist of three items—papers on "The Creep Time and Stability of Steels at Constant Stress and Temperature" by S. H. Weaver, and on "The Interpretation of Creep Tests" by C. R. Soderberg and the Progress Report of the Joint Research Committee, with discussion.

The method of presentation of the information and data in the corrosion symposium will be in accordance with the different base metals, and eight technical papers by prominent technologists will be given. Some of the subjects to be covered include: introduction to corrosion resisting metals; alloys of aluminum; nickel and nickel-base alloys; zinc in the chemical industries; lead; cast iron in chemical equipment; copper and copper-base alloys; and corrosion-resistant steel (stainless type).

Committee on Heat Insulation; Plastics

AT the recent meeting of Committee E-10 on Standards, there was discussion of the desirability of undertaking standardization and related work in the field of heat insulating materials and also plastics. Considerable interest has been shown in the subject of heat insulating materials, and due to the increased use of such materials in dwelling construction a definite need has developed for adequate standard methods of test to determine, not only the heat insulating value of the various materials offered, but also to cover other very important properties of such materials.

On the recommendation of Committee E-10, the Executive Committee at its October meeting approved the organization of a new A.S.T.M. standing committee to deal with heat and thermal insulating materials with the exception of refractories, which latter field is covered by the Society's Committee C-8. An organization committee is expected to be appointed to study matters of scope, range of activities, personnel and related matters.

The subject of plastics and synthetic resins has been under discussion for several years. Much interest was indicated at a meeting devoted to this subject sponsored by the New York District Committee on April 21, 1936, and Committee E-6 on Papers and Publications has before it a suggestion that a more formal symposium on this subject be arranged either at a regional meeting of the Society or at a session of a future annual meeting. Materials of this general type are finding increasing use in mechanical and other engineering applications, and since the several materials vary considerably in mechanical properties it is desirable that adequate tests be established in order to determine the suitability of the materials for different uses.

Criticism of Proposed Standards

ONE of the basic principles underlying the development of standards by A.S.T.M. is that *everyone* interested in a specification or test method shall have an opportunity to participate in its development—by expressing viewpoints in committees and before the Society, or presenting data relevant to the subject considered or in other ways.

During September and October, the tentative standards which were approved at the annual meeting or by Committee E-10 on Standards are edited and published. In order to stimulate comment and criticism these are brought to the attention of trade associations and other organizations interested, business journals, and, of course, their widespread use in the various phases of production and consumption tend to stimulate comment.

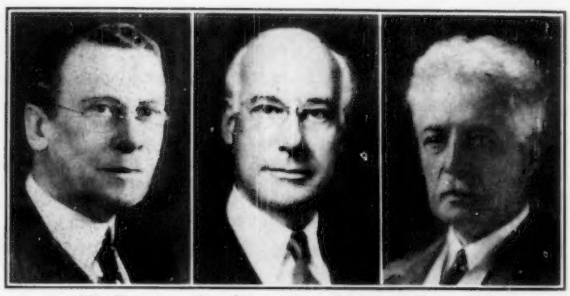
One purpose in issuing proposed standards in tentative form is to elicit constructive criticism and comment, of which the standing committees in charge take due cognizance before recommending adoption as a formal standard. In this connection each A.S.T.M. member can be of service by reviewing critically tentative standards in which he or his company is interested or by bringing them to the attention of other interested parties, to the end that finally a standard will be adopted which will represent a true consensus of industry, be practical, complete and authoritative. Comments should be forwarded to Society Headquarters.

XI. Long-Time Society Committee Members

Eleventh in the Series of Notes on Long-Time Members

THERE are presented below as a continuation of the series of articles in the A.S.T.M. BULLETIN comprising notes on the outstanding activities of long-time A.S.T.M. members, outlines of the work of three additional members. In general the men whose activities are described in this series have been affiliated with the Society for 25 years or more and have taken part in committee work for long periods of time. No definite sequence is being followed in these articles.

A. W. DOW, Vice-President and Chief Engineer, Colprovia Roads, Inc., Rochester, N. Y., and New York City, was graduated from Columbia University, School of Mines, in 1888. He was Assistant Chemist, Barber Asphalt Paving Co. for a number of years and from 1894 to 1906 was Inspector of Asphalt and Cement, and Chemist of the Engineering Department, District of Columbia. It was during this time that he devised the Dow penetration machine and the Dow ductility test for the examination of bituminous materials. From 1906 to 1935 he was in consulting engineering practice on all matters pertaining to paving, waterproofing, roofing, etc., and for 25 years was in partnership with Francis B. Smith. He has been in his present position since 1935.



A. W. Dow Bradley Stoughton Albert Sauveur

Affiliated with the Society since 1898, he has taken a very active part in committee work. A member of Commitee D-4 on Road and Paving Materials since its organization in 1903 he was chairman of the Subcommittee on Bituminous Paving Materials for some 16 years. When Committee D-8 on Bituminous Waterproofing and Roofing Materials was organized in 1905 he became its first secretary, serving until 1911. Other A.S.T.M. committees on which he has had periods of service include Committees D-1 on Paint, Varnish, Lacquer, and Related Products, D-2 on Petroleum Products and Lubricants and E-1 on Methods of Testing. He was one of the members participating in the organization of Committee C-1 on Cement. In addition to membership in several societies, he is one of the charter members of the American Institute of Chemical Engineers.

ALBERT SAUVEUR, Metallurgical Engineer and Emeritus Professor of Metallurgy, Harvard University, was Chemist, Pennsylvania Steel Co., in 1889, later in charge of Research Laboratory, Illinois Steel Co., and then Instructor, Assistant Professor, and since 1905 Professor of Metallurgy and Metallography, Harvard University. He became Professor Emeritus in June, 1935.

Space limits more than brief mention of some of the accomplishments of this most eminent metallurgist and professor. A pioneer in many metallurgical developments, particularly in metallography and heat treatment of iron and steel, he has received medals and honors from numerous governments and institutions. A Chevalier of the Legion of Honor of France, Officer of the Order of Leopold of Belgium, and Officer of the Academy of France, he has been awarded the British Iron and Steel Institute Medal, Franklin Institute Elliott Cresson Gold Medal and was the first recipient of the Albert Sauveur Achievement Medal of the American Society for Metals. He has been a prolific writer of articles and papers dealing with metallurgy of iron and steel and a number of his contributions are included in early *Proceedings* of A.S.T.M.

A member of the old International Association since 1896, he has been affiliated with the Society from its very beginning. He served on the A.S.T.M. Executive Committee from 1913 to 1915, and was a member of Committee A-4 on Heat Treatment of Iron and Steel from its organization in 1906 and served as chairman of this committee from 1913 to 1918. He was a member of Committee A-3 on Cast Iron from the beginning and served until 1933.

It is interesting to note that the Committee on Heat Treatment of Iron and Steel, originally designated Committee F, for a number of years consisted of four members—H. M. Howe, chairman; William Campbell, Albert Sauveur and Bradley Stoughton.

BRADLEY STOUGHTON, Director of Metallurgical Engineering, and Dean, College of Engineering, Lehigh University, was graduated from the Yale Scientific School in 1893 when he received the degree of Ph.D. in Civil Engineering. In 1896 he received the degree of B.S. in Mining and Metallurgy from Massachusetts Institute of Technology. From 1902 to 1908 he was on the faculty of the Metallurgical Department, School of Mines, Columbia University, and was Acting Head of the Department. For eight years he was Secretary, Editor and Executive Officer of the American Institute of Mining and Metallurgical Engineers, and since 1923 has been at Lehigh University. He was Metallurgist, South Works, Illinois Steel Co.; Chief of the Cost Statistical Division, American Steel and Wire Co.; and Manager, Bessemer Steel Dept., Benjamin Atha and Co. He is consulting engineer for a number of organizations. Professor Stoughton has written a widely used textbook on "The Metallurgy of Iron and Steel" and is author and co-author of other textbooks and numerous papers, a number of which are in the A.S.T.M. *Proceedings*.

A member of the Society since 1902, he served as a member of the Committee on Heat Treatment of Iron and Steel until this committee was discontinued and he is now a member of the Joint Committee on Definitions of Terms Relating to Heat Treatment on which he represents the American Society for Metals. He was a member of the former A.S.T.M. Committee on Alloy Steels and the Committee on Hardness Tests, serving as chairman of this latter committee. He is a member of numerous societies.

Alloys of Iron Research

WHILE activities of the Iron Alloys Committee of the Engineering Foundation are followed closely by some A.S.T.M. members, it is thought many others may find of interest a short record of results of the committee's work. These results are being made available to metallurgists, engineers, inspectors of materials and producers and users of special steels and cast irons and alloying metals in a series of books of the following titles:

THE ALLOYS OF IRON BOOKS

1. Iron and Molybdenum
2. Iron and Silicon
3. Iron and Tungsten
4. Iron and Copper
5. Principles of Phase Diagrams
6. The Metal—Iron (High Purity Iron)
7. Iron and Carbon: Constitution
8. Iron and Carbon: Properties
9. Iron and Chromium: Low Chromium Alloys
10. Iron and Chromium: High Chromium Alloys
11. Iron and Nickel: Constitution
12. Iron and Nickel: Properties
13. Iron and Manganese
14. Iron and Vanadium
15. Cast Iron
16. Iron and Aluminum
17. Iron with Zinc and Tin
18. Iron with Sulphur, Phosphorus and Arsenic
19. Iron with Zirconium, Uranium and Titanium
20. Solid and Gaseous Inclusions in Iron and Steel

The first seven books have been published. Others are in various stages of preparation for publication during the next few years. Information from the Iron Alloys Committee indicates that Monograph No. 8 is to be published in the fall; No. 9 is completed and is being reviewed by the consulting editors with anticipated publication early in 1937. Monographs Nos. 10 to 15 inclusive are in various stages of active preparation and Nos. 16 to 20 are in the formative stage with a large amount of data assembled for them.

The books published have been enthusiastically received by metallurgists and other users. These books are the result of a critical review of world literature with the aid of leading metallurgists in this and other countries. The research and the books are being made possible by the generous contributions of services of specialists, by the cooperation of technical societies and institutes, and by substantial subscriptions of money by industries and the Foundation.

The production and use of special steels and cast irons has been growing very rapidly and has been revolutionized in the past six years. Therefore, the accessibility of critically selected information from all over the world is of timely value to producers and users of these metals. It enables laboratory research to be planned more effectively and carried out more economically. It gives a valuable critical summary of all important data on alloy steels and irons to the engineers designing and inspecting structures and machines and manufactured commodities, as well as to men charged with inspection of materials.

A set of the Alloys of Iron Monographs as issued is being placed in the library at A.S.T.M. Headquarters. Prof. G. B. Waterhouse is Chairman and Director of the Iron Alloys Committee, with Frank T. Sisco as Editor, and Jerome Strauss, Vice-President, Vanadium Corporation of America, represents A.S.T.M. on the committee.

Further information on the various publications can be obtained from the Iron Alloys Committee, 29 W. 39th St., New York City.

A.S.T.M. Research Fund Being Used

TWO grants to committees of the Society in support of research projects have recently been made by Committee E-9 on Research. The first project, sponsored by Committees C-9 on Concrete and Concrete Aggregates and E-1 on Methods of Testing, is an extension for another year of the studies begun a year ago at the University of Illinois on "The Effect of Testing Speed on Strength and Elastic Properties of Concrete," the results of which were reported to the Society at the recent annual meeting in a paper of that title by Messrs. P. G. Jones and F. E. Richart. In the work so far done three grades of concrete, in the form of 6 by 12-in. cylinders, have been tested to failure at ages of 7 and 28 days in periods of time from 1 sec. to 4 hr., the rate of stress application ranging from 3870 down to 0.12 lb. per sq. in. per sec. An oscillograph recorder equipped with super-sensitive elements was developed to provide the requisite precision of measurement. These studies pointed to the desirability of a study of creep in concrete in relation to speed of testing. The present program, therefore, includes determinations of creep over relatively short periods of time with variations in concrete mixture, age, and stress intensity. Relationship between "short-time" and "long-time" creep will be studied, as well as the nature of creep to determine whether it is essentially a plastic action or whether it is governed by other laws. The effect of quality and quantity of cement paste on the creep phenomenon will also be examined. Committee E-9 is contributing $600 from the Research Fund towards this project.

The second project relates to the measurement of power factor and dielectric constant of liquid insulation and is sponsored by Committee D-9 on Electrical Insulating Materials. This committee has experienced considerable difficulty in obtaining concordant measurements in various laboratories on the same materials using test cells of apparently similar design. Thus similar cells of slightly different materials may give results differing several hundred per cent. The committee has accordingly proposed that a test cell of an accepted superior design be built, to be circulated among cooperating laboratories for tests on identical materials as a means of clearing up the source of the present unexplainable differences in test values. The sum of approximately $250 is being contributed from the Research Fund to build the test cell.

A third request for financial support from the Research Fund is under consideration, relating to an investigation of various methods of capping clay tile upon the apparent strength values obtained in the compression test, proposed by Committee C-10 on Hollow Masonry Building Units.

1937 A.F.A. Meeting in Milwaukee

THE Forty-first Annual Convention and Exposition of the American Foundrymen's Assn. is to be held during the week of May 2, 1937, in Milwaukee, one of the foremost foundry centers in the United States. Meetings and exhibit will be staged in the Milwaukee Auditorium. Papers on all phases of foundry practice and on management problems will be given at the meeting with special attention being given to the medical and legislative aspects of safety and hygiene. This part of the problem of foundry management will be supplemented by a special section in the exhibition.

Large Number of Research Projects Included in Annual Review

Work Involves Properties of Materials and Methods of Testing

THE charter of the Society states that its objects are "the promotion of knowledge of the materials of engineering and the standardization of specifications and the methods of testing." In his presidential address[1] on the first-named purpose, F. M. Farmer asked the question "What is our purpose in promoting knowledge of materials?" His answer—"to increase the efficiency and effectiveness of materials of engineering," ably states this broad purpose.

In general, knowledge can be promoted by A.S.T.M. in three ways: by developing and publishing information obtained through research carried on by the Society itself, by publishing information developed by its members individually, and by extending the usefulness of existing information. Research widens the circle of knowledge and publicity makes it available conveniently and thus more useful.

The research phase of A.S.T.M. work goes hand-in-hand with standardization, since new developments today become the standards of tomorrow. Without continued research, progress would cease. To supply this new information upon which future standardization may be based is the constant work of A.S.T.M. Committees.

The research work of A.S.T.M. Committees in studies of materials and the allied testing field is reviewed annually by Committee E-9 on Research. This review in the form of a summary of the 126 research projects on which A.S.T.M. Committees are at work is given below.

The summary has been divided into two parts. Part I—Research on Properties of Materials, includes 50 active committee projects initiated primarily to extend and amplify the knowledge of the properties of materials; and Part II—Research on Methods of Testing, includes 76 committee projects devoted to methods of testing in connection with which are conducted investigations (sometimes of considerable magnitude) that may lead to the preparation of standard test methods and which are not intended primarily to promote knowledge of materials.

The summary includes information not otherwise generally available, except after laborious reference to reports of 60 research, joint and standing committees. Except for several new investigations not as yet reported upon, reference is made in every case to the latest report on each project. Reports now appearing in preprints prepared for the 1936 annual meeting will be published in the 1936 *Proceedings* which publication should be referred to when the *Proceedings* become available in December.

Part I— Research on Properties of Materials

Corrosion of Ferrous and Non-Ferrous Metals

Atmospheric Corrosion Tests of Uncoated Sheets (Committee A-5).—Exposure tests of bare (uncoated) steel and iron sheets under atmospheric conditions at Pittsburgh, Pa., Fort Sheridan, Ill., and Annapolis, Md.

Tests completed at Pittsburgh in 1923 and at Fort Sheridan in 1928, see *Proceedings*, Vol. 23, Part I, p. 147 (1923); Vol. 28, Part I, p. 152 (1928), respectively. Annapolis tests still in progress; complete record of failures of No. 22 gage sheets reported, see reprint, 1936 Report of Committee A-5.

[1] *Proceedings*, Am. Soc. Testing Mats., Vol. 25, Part I, p. 34 (1925).

Atmospheric Corrosion Tests of Uncoated Sheets (Committee A-5).—Comprehensive field corrosion studies at five test locations, representing various atmospheric conditions, on Nos. 16, 22 and 28 gage sheets both uncoated and galvanized with various weights of zinc coatings. For report of failures of all galvanized sheets after 7-yr. exposure at Altoona, Pa., see *Proceedings*, Vol. 34, Part I, p. 159 (1934), and after 8½-yr. exposure at Brunot Island, Pittsburgh, Pa., see *Proceedings*, Vol. 35, Part I, p. 88 (1935). Current report relates observations made on this project and on atmospheric corrosion tests of metallic-coated hardware, etc., and electroplated coatings on steel (mentioned below), as regards performance at Brunot Island where corrosion has progressed far enough to attempt comparisons. See reprint 1936 Report of Committee A-5.

Test Racks at Fort Sheridan, Ill., October 16, 1922 (See first item above; also page 1)

Atmospheric Corrosion Tests of Metallic-Coated Hardware, Structural Shapes, Tubular Goods, Etc. (Committee A-5).—Comprehensive field corrosion studies at five test locations, representing varying atmospheric conditions, on metal products coated with the following 8 types of coatings by commercial operations: Hot-dipped zinc, electrodeposited zinc, sherardized (zinc) applied in gas-heated drum, sherardized (zinc) applied in electrically heated drum, electrodeposited cadmium, hot-dipped aluminum, hot-dipped lead (Amaloy), parkerized. Results reported of inspections of the specimens of coated hardware, structural shapes, tubular goods at all test locations after 2-yr., 4-yr. and 6-yr. exposures, respectively, see *Proceedings*, Vol. 31, Part I, p. 184 (1931); Vol. 33, Part I, p. 154 (1933); Vol. 35, Part I, p. 92 (1935). Current report relates observations on this project with other corrosion studies by the committee; see reprint, 1936 Report of Committee A-5.

Investigation of Electroplated Coatings on Steel (Joint Committee of American Electro-Platers' Society, National Bureau of Standards and A.S.T.M.).—An extension of tests of plated coatings on hardware mentioned above. Specimens plated with zinc, cadmium, copper, nickel, chromium or combination of these metals; coatings produced under controlled defined conditions. Samples exposed in six outdoor locations with parallel laboratory and accelerated exposure tests. For summary of progress of these studies, see *Proceedings*, Vol. 33, Part I, p. 164 (1933); also Vol. 34, Part I, p. 166 (1934). Specifications for electrodeposited coatings of zinc, cadmium, and nickel and chromium on steel have been prepared, see *Proceedings*, Vol. 35, Part I, pp. 682 to 689 (1935). Current report relates observations on this project with other corrosion studies by the committee; see reprint, 1936 Report of Committee A-5.

Atmospheric Corrosion Tests of Electroplated Coatings on Non-Ferrous Metals (Joint Committee of American Electro-Platers' Society, National Bureau of Standards and A.S.T.M.).—Investigation of value of electroplated coatings of nickel, copper, chromium, cadmium, zinc or combinations of these metals on specimens of copper, brass, nickel-brass, rolled zinc, zinc die castings, and iron after atmospheric exposure at 6 test locations, namely, Key West, Fla.; New York, N. Y.; Pittsburgh, Pa.; Sandy Hook, N. J.; State College, Pa., and Washington, D. C. Tests also include continuation of certain specimens from earlier investigation of coatings on steel and some repeat tests on steel specimens. See preprint, 1936 Report of Joint Committee.

Atmospheric Corrosion Tests on Wire and Wire Products (Committee A-5).—Comprehensive corrosion studies, at 11 test locations, of wire and wire products, including plain wire, barbed wire, wire strand, farm-field fencing and chain-link fence. Materials to be tested include: Uncoated wire and fencing (both copper-bearing and non-copper-bearing), galvanized wire and fencing, stainless steel wire and fencing, copper-weld wire and fencing, lead-clad wire and fencing, dichromate-treated wire (unfabricated). Test sites, representative of atmospheric conditions from coast to coast, are State College, Pa.; Lafayette, Ind. (Purdue University); College Station, Tex. (Agricultural and Mechanical College of Texas); Ames, Iowa (Iowa State College); Ithaca, N. Y. (Cornell University); Pittsburgh, Pa.; Sandy Hook, N. J.; Bridgeport, Conn.; Manhattan, Kans.; Davis, Calif.; Santa Cruz, Calif. For details of wire test program, see *Proceedings*, Vol. 34, Part I, p. 172 (1934). Installation of test materials at exposure locations now under way.

Total Immersion Tests on Uncoated Sheets (Committee A-5).—Tests on bare (uncoated) steel and iron sheets immersed in acid mine water at Calumet, Pa., in saline water at Annapolis, Md., in city water at Washington, D. C.; in sea water at Key West, Fla.; Portsmouth, N. H., and Port Arthur, Tex.; also tests in open sea water to determine the effect of corrosion on copper-steel pipe and on steel ship plate, with and without copper, when riveted with rivets of iron and steel with varying copper contents.

Tests completed at Calumet in 1921, at Washington in 1928, and at Annapolis in 1930, see *Proceedings*, Vol. 21, p. 157 (1921); Vol. 28, Part I, p. 160 (1928); Vol. 30, Part I, p. 223 (1930), respectively. All No. 22 gage sheets at Portsmouth and Key West have failed; for detailed record of failures, see *Proceedings*, Vol. 32, Part I, p. 105 (1932); Vol. 33, Part I, p. 144 (1933). For detailed record of failures of No. 16 gage sheets at Key West, Fla., and Portsmouth, N. H., see reprint, 1936 Report of Committee A-5.

Accelerated Corrosion Tests (Committee A-5).—Study of various methods of accelerated corrosion tests, with particular reference to their application to metallic-coated products. Related to the atmospheric corrosion tests mentioned above. No report available.

Embrittlement of Hot-Dipped Galvanized Structural Steel (Committee A-5).—Investigation of the effect of cold working on the physical properties of structural steel before and after galvanizing by the hot-dipped process, to determine the extent of apparent embrittlement, its cause and remedies therefor. The 1931 report of Subcommittee X on Embrittlement Investigation, *Proceedings*, Vol. 31, Part I, p. 211 (1931), gives history of project with selected bibliography. Investigative studies reported in paper by Samuel Epstein, "Embrittlement in Hot-Galvanized Structural Steel," see reprint pamphlet, also *Proceedings*, Vol. 32, Part II, p. 293 (1932). For supplementary work in progress, see *Proceedings*, Vol. 34, Part I, p. 184 (1934). Recommended practice for safeguarding against embrittlement of hot-galvanized structural steel products and procedure for detecting embrittlement adopted in 1935.

Corrosion Tests of Stainless Steels (Committee A-10).—Laboratory corrosion tests of stainless steels; at present restricted to four typical stainless steels, namely, (1) 18 per cent chromium, 8 per cent nickel alloy; (2) 17 per cent chromium alloy; (3) 13 per cent chromium alloy with 0.08 to 0.12 per cent carbon, annealed at 1300 F., and (4) 13 per cent chromium alloy with 0.08 to 0.12 per cent carbon, annealed at 1700 F. and three corrosion tests of the inspection type, namely, the Du Pont acid-immersion test, the Navy Department, salt-spray test and the copper-sulfate stain test. Studies completed, for details of test methods, data obtained and discussion of results, see *Proceedings*, Vol. 33, Part I, p. 178 (1933). Further work to be undertaken, including tests to determine the utility of the various alloys, and studies of recommended methods of corrosion testing, see preprint, 1936 Report of Committee A-10.

Standardization of the Practice of Corrosion-Resistance Testing (Committee B-3).—A study of four corrosion tests, namely, total immersion, alternate immersion, spray and accelerated electrolytic. Six non-ferrous metals tested by a number of cooperating laboratories, each following carefully prescribed methods. Detailed description of procedure for each test, preparation of solutions and specimens, materials used and critical discussion of each test, see *Proceedings*, Vol. 32, Part I, p. 201 (1932).

Atmospheric Corrosion of Non-Ferrous Metals and Alloys (Committee B-3).—Comprehensive field corrosion studies at 9 test locations, representing varying atmospheric conditions, on 24 non-ferrous metals and alloys in the form of rolled sheet or strip. Corrosion over 25-year period to be measured. Data reported showing changes in weight and tensile properties after 1-yr. and 3-yr. exposures of the 24 non-ferrous metals and alloys; also visual inspection results and meteorological data at test locations during exposure periods, see *Proceedings*, Vol. 33, Part I, p. 234 (1933); Vol. 35, Part I, p. 142 (1935).

Corrosion of Non-Ferrous Metals and Alloys in Liquids—Field Tests (Committee B-3).—Testing in the field, metals in several common solutions under conditions representative of those in use in industrial processes. Metals used are those which may reasonably be expected to prove practicable for use in each process. The four solutions to be used are: NaOH, HCl, NaCl and H_2SO_4. Data reported on metals exposed to sodium chloride solutions, sodium hydroxide and sulfuric acid, see *Proceedings*, Vol. 35, Part I, p. 160 (1935).

Galvanic and Electrolytic Corrosion of Non-Ferrous Metals and Alloys (Committee B-3).—Study of galvanic effects (that is, effect of contact between dissimilar metals upon the rate of corrosion of each) at 9 test locations representing varying atmospheric conditions on galvanic couples of metals, used commercially under conditions of tests, and electrolytic action on couples of metals and alloys in hot water, sea water, NaOH and H_2SO_4. Includes study of stainless steel in contact with various non-ferrous metals. Record of corrosion after 1-yr. and 3-yr. periods of exposure on couple combinations of zinc, aluminum, lead, tin, nickel, copper and mild steel at 9 test locations reported, see *Proceedings*, Vol. 34, Part I, p. 236 (1934); Vol. 35, Part I, p. 167 (1935).

Relative Life of Various Screen Wire Cloths (Committee D-14).—To determine the relative life of the higher-grade screen wire cloths when exposed to various atmospheric agencies such as corrosion and wind, as they exist in different localities and climates,

so that purchasers of such material may make an economic selection best suited to their particular conditions. For report of failures after 4-yr. exposure, see *Proceedings*, Vol. 30, Part I, p. 863 (1930). Latest report contains summary of essential details and results of exposure tests on 7 non-ferrous compositions after 9-yr. exposure period at Pittsburgh, Pa.; Portsmouth, Va.; Cristobal, C. Z., and Washington, D. C., reported by G. W. Quick, "Atmospheric Exposure Tests on Non-Ferrous Screen Wire Cloth," see *Proceedings*, Vol. 35, Part I, p. 458 (1935).

Ferrous and Non-Ferrous Metals, General

Investigation of the Effect of Phosphorus and Sulfur in Steel (Joint Committee).—An investigation by a joint committee under the auspices of eleven national organizations, to study the effect of residual and added sulfur and phosphorus in steels of the following classifications: low-carbon steels, such as rivet steel; medium-carbon structural steels; forging steels; rail steel; and steel castings. For final report on effect of sulfur in steel, see reprint, 1936 Report of Joint Committee, which includes list of the committee's reports on effect of sulfur. Since this completes the current program of work the Joint Committee has been disbanded.

Research on Yield Point of Structural Steel (Research Committee).—The committee will consider (1) what is the range of yield point of structural steel (that is, low-carbon, medium-carbon, silicon and nickel steels), due to a number of important factors, when furnished under specifications; and (2) what testing procedure will insure sufficiently correct determination of the yield point at minimum expense. The committee has reported four series of tests on Item (2) dealing mainly with effect of speed of movable head on yield point of structural steel. See *Proceedings*, Vol. 27, Part I, p. 646 (1927); Vol. 28, Part I, p. 105 (1928); Vol. 29, Part I, p. 101 (1929); and Vol. 31, Part I, p. 136 (1931). Report of tests on specimens from structural steel shapes, Vol. 30, Part I, p. 133 (1930), contains data on range in yield point, ratio of yield point to ultimate strength and effect of location of test specimen.

A series of tests to determine the effect of aging on the yield point of structural steel rods now under way.

Study of Grain Boundary Precipitation in Chromium-Nickel Alloy Steel (Committee A-10).—Investigation of the phenomenon of grain boundary precipitation in the 18 per cent chromium, 8 per cent nickel alloy steels with a view to determining the nature of the precipitate. Studies are being undertaken on two heats of these steels in three conditions, quenched, medium and badly precipitated as to carbide, see preprint, 1936 Report of Committee A-10.

Quality of Wrought Iron (Committee A-2).—A study particularly of the influence of raw material and processes of manufacture on the properties and structural characteristics of wrought iron. Report on Quality Standards of Wrought Iron prepared to bring about a better understanding among users of wrought iron concerning its underlying characteristics, the meaning of test results, and the various factors by which the quality may be judged, see *Proceedings*, Vol. 34, Part I, p. 129 (1934).

Correlation of Properties of Iron Castings and Test Bars (Committee A-3).—A study of the relationship of properties of iron castings with the properties of coupons attached to castings and of separately cast test bars. Cooperative study of test bars in connection with the specifications for gray-iron castings resulted in securing test data permitting of revisions in the specifications, see *Proceedings*, Vol. 35, Part I, p. 148 (1935).

Impact Testing of Cast Iron (Committee A-3).—A study of the various types of single-blow and repeated impact tests, to determine impact values of cast iron and to ascertain the type of test most suitable to determine such values. Extensive data on impact strength and other physical properties obtained on 25 sets of cast-iron test bars reported, see reprint pamphlet, also *Proceedings*, Vol. 33, Part I, p. 87 (1933). Drop test being studied as valuable measure of resistance of cast iron to repeated impact.

Pig Iron Quality (Joint Committee).—Study as to what constitutes quality or "normality" of pig iron and the development of methods for the evaluation of pig iron qualities. Work to be undertaken by Joint Committee sponsored by the American Foundrymen's Assn., American Institute of Mining and Metallurgical Engrs., Gray Iron Inst., Malleable Iron Research Inst. and A.S.T.M.

Effect of Temperature on the Properties of Metals (Joint Research Committee of A.S.M.E. and A.S.T.M.).—The scope of these investigations includes (1) an accumulation of service data of various metals under extreme temperatures; (2) studies leading to standardization procedure for testing metals at high and low temperatures; and (3) outlining and fostering new research work in this field, giving consideration first to the various metals and alloys intended for high-temperature service in power stations, oil refineries, etc. See report of Joint Committee for 1931, *Proceedings*, Vol. 31, Part I, p. 106 (1931), containing report of Committee III on Projects and Work outlining program.

Tests for short-time and for long-time (creep) high temperature tension tests of metallic materials developed; results of tests and other data in explanation of the test methods reported, see *Proceedings*, Vol. 33, Part I, pp. 996, 1004 and 209 (1933).

Current report contains general summary, comparison of procedure and results obtained on cooperative study of low-temperature impact tests on 0.35 per cent carbon steel (K20); also a report on long-time creep tests of 18 per cent chromium, 8 per cent nickel steel and 0.35 per cent carbon steel, see preprint, 1936 Report of Joint Committee, which also lists titles of five reports of work sponsored by the committee and presented in December, 1935, before the American Society of Mechanical Engineers.

Attention is also called to the Symposium on Effect of Temperature on the Properties of Metals held at the 1931 annual meeting and sponsored by the Joint A.S.M.E.-A.S.T.M. Research Committee. Symposium published, contains 27 papers with discussion.

Fatigue of Metals (Research Committee).—The broad purpose of the committee is to summarize and correlate the work that various laboratories are doing in connection with the fatigue of metals and to study the relationship between fatigue failure and other strength properties of metals and their atomic and metallographic structure. The committee has prepared abstracts of articles on fatigue of metals under repeated stress appearing in the technical press from July 1, 1928, to June 30, 1930. Consideration being given to method of studying fatigue phenomena by use of "probable damage line" for metals under repeated stress. For a brief statement of the "present status of knowledge and current theory in the field of fatigue of metals" and a "summary of knowledge on corrosion-fatigue and on significance and limitations of fatigue test results," see *Proceedings*, Vol. 30, Part I, p. 259 (1930), Vol. 32, Part I, p. 139 (1932). See also 1933 Edgar Marburg Lecture by H. J. Gough on "Crystalline Structure in Relation to Failure of Metals—Especially by Fatigue," reprint pamphlet, also *Proceedings*, Vol. 33, Part II, p. 3 (1933).

Abstracts, prepared by the Research Committee, on fatigue studies appear currently in *Metals and Alloys*.

For notes on fatigue tests on rotating-beam testing machines, centrally loaded and cantilever types, see *Proceedings*, Vol. 35, Part I, p. 113 (1935). Current report contains pertinent notes and comments on fatigue studies and presents results of cooperative study of X-ray diffraction as a means of detecting impending fatigue failure, see preprint, 1936 Report of Research Committee.

X-ray Metallography (Committee E-4).—A study of the applications of the X-ray (1) in the location of cavities and cracks and other structural variations in metals (metal radiography); (2) to determine the arrangement of atoms or molecules in crystals, size of grain in crystalline aggregates and the orientation of such crystalline material X-ray crystallography). Symposium on Radiography and X-ray Diffraction Methods held this year, comprising 12 papers, issued as separate reprint.

Study reported of X-ray diffraction as a means of detecting impending fatigue failure, carried on in cooperation with Research Committee on Fatigue of Metals, see preprint, 1936 Report of Research Committee.

General Study of Properties of Babbitt Metal (Committee B-2).—This project includes determination of physical properties of white-metal bearing alloys in the A.S.T.M. standards; correct pouring temperatures of babbitt metals; effect of ratio of length to diameter in compression testing of babbitt metal; and effect of impurities on the properties of babbitt metal, such as friction, wearing properties, fluidity, brittleness and amount of drossing. Investigation partially completed, active for certain portions. Studies on this subject reported by H. K. Herschmann and J. L. Basil on "Mechanical Properties of White-Metal Bearing Alloys at Different

Temperatures," see *Proceedings,* Vol. 32, Part II, p. 536 (1932); by J. N. Kenyon on "The Effect of the Addition of Lead on the Hardness of Certain Tin-Base Bearing Alloys at Elevated Temperatures" and by C. E. Swartz and A. J. Phillips on "A Comparison of Certain White-Metal Bearing Alloys, Particularly at Elevated Temperatures," see *Proceedings,* Vol. 33, Part II, pp. 430 and 416 (1933). See also preprint of 1936 paper by J. N. Kenyon, "The Effect of the Addition of Lead on the Endurance Limit of a Certain Tin-Base Bearing Alloy."

Properties of Copper-Base Alloys in Ingot Form (Committee B-5).—A study of the properties of selected compositions of copper-base alloys within composition ranges specified in the A.S.T.M. Standard Specifications for Copper-Base Alloys in Ingot Form for Sand Castings (B 30). This research is being carried on by a research associate placed at the National Bureau of Standards by the Non-Ferrous Ingot Metal Institute. Committee B-5 is cooperating in this work. Researches reported in paper by H. B. Gardner and C. M. Saeger, Jr., "The Effect of Sulfur and Iron on the Physical Properties of Cast Red Brass (85 Cu, 5 Sn, 5 Zn, 5 Pb)," *Proceedings,* Vol. 33, Part II, p. 448 (1933).

Investigation of Aluminum and Zinc-Base Die-Casting Alloys (Committee B-6).—An extensive investigation of die-casting alloys as to composition, strength, hardness, brittleness and resistance to corrosion; also finishing properties of die castings. Studies cover commercial compositions of aluminum-base and zinc-base alloys. Purpose of investigation is to supply dependable information on the properties of alloys suitable for die castings and the formulation of specifications based either on the alloys tested or on alloys developed as a result of the investigation. Specifications have been issued.

Data showing physical properties of aluminum-base die-casting alloy specimens after 1-yr. exposure at 5 outdoor test locations and 4 indoor locations reported, see *Proceedings,* Vol. 32, Part I, p. 265 (1932). For report on inspections of zinc-base die-cast specimens after 4-yr. exposure at 6 outdoor test locations, see *Proceedings,* Vol. 34, Part I, p. 255 (1934). Report for 1935 covers results of 5-yr. exposure tests of 12 aluminum and 10 zinc alloys cast by several producers and exposed at 6 outdoor and 4 indoor locations; data presented covers chemical analysis, tension, impact and expansion tests; also description of photographic inspections of specimens of all alloys after 4-yr. outdoor exposure at 6 locations, see *Proceedings,* Vol. 35, Part I, p. 190 (1935).

Aluminum alloy die-cast specimens of higher purity than that specified for Alloys Nos. IV and V have been extensively studied. Description of specimens, chemical analysis of alloys and original mechanical properties reported in *Proceedings,* Vol. 35, Part I, p. 184 (1935). Current report contains results after 12, 26 and 52-weeks exposure to salt spray and after alternate immersion in salt solution (not preprinted), *Proceedings,* Vol. 36, Part I (1936). Current report also contains paper by J. C. Fox on "Finishing of Die Casting," see preprint, 1936 Report of Committee B-6.

Cement

Compressive Strength Tests of Cement Mortars (Committee C-1).—Development of satisfactory commercial test for compressive strength of portland-cement mortars. Comprehensive investigation undertaken on 12 cements by 10 laboratories to study effect on results of refinements in proposed test procedure; relation between standard tension and plastic mortar strength results; the relative merits of standard Ottawa *versus* graded Ottawa sand for cube tests, to obtain data as basis of possible specification requirements; effect of rate of loading on results, and to secure voids-cement ratio as possible further refinement in test. Extensive data reported and tentative method prepared, see *Proceedings,* Vol. 34, Part I, pp. 322 and 743 (1934). Present considerations cover problems inherent in standard compression test, including requirements for cube mold, method of molding specimens, measuring consistency of mortar and water retention and air-voids of mortar, see preprint, 1936 Report of Committee C-1; also preprint of 1936 paper by J. R. Dwyer on "Effect of Departure from Planeness of Bearing Surfaces on the Compressive Strength of 2-in. Mortar Cubes."

Particle Size and Specific Surface of Cement (Committee C-1).—Development and studies of apparatus and procedures for determining sub-sieve gradation of particle-size and specific surface of cements. Turbidimeter developed at Cement Reference Laboratory of National Bureau of Standards, see L. A. Wagner, "A Rapid Method for the Determination of the Specific Surface of Portland Cement," *Proceedings,* Vol. 33, Part II, p. 553 (1933). Cooperative studies reported on 4 cements by 25 laboratories of this and other apparatus and methods, see Vol. 34, Part I, p. 315 (1934). Method developed for fineness tests of cement using turbidimeter, see Vol. 35, Part I, p. 777 (1935).

Volume Change and Soundness of Portland Cement (Committee C-1).—To obtain information on (1) volume change of neat cement bars when subjected to various temperatures and storage conditions and (2) the influence of cement on volume change characteristics of neat cement, mortar and concrete under various conditions of storage. Data reported on item one for 16 commercial cements, see *Proceedings,* Vol. 34, Part I, p. 356 (1934). Other studies described in paper by H. F. Gonnerman on "Study of Cement Composition in Relation to Strength, Volume Change, Resistance to Sulfate and to Freezing and Thawing of Mortars and Concrete," see *Proceedings,* Vol. 34, Part II, p. 244 (1934). Current report contains results of tests for expansion or contraction in neat cement bars made on 34 high-early-strength cements, see preprint, 1936 Report of Committee C-1.

Mineral Aggregates

Research in Mineral Aggregates (Joint Committee).—Correlation of research in mineral aggregates under auspices of the Highway Research Board, National Research Council. Considerable information assembled on the nature of shale and its effect when present in aggregates used in concrete and on coatings of various sorts on aggregates and their effects. Abrasion, hardness and toughness tests are receiving attention, and the significance of flat or elongated particles in aggregates is being considered. The committee is in constant touch with researches throughout the country on accelerated durability tests for aggregates. The standardization of an accelerated test and correlation with service behavior is recognized as a pressing necessity, and the Committee is seeking to encourage coordination in these researches by distributing research outlines to interested agencies. See Report of Joint Committee, *Proceedings,* Highway Research Board, Vol. 12, Part I, p. 265 (1932).

Report on present status of the sulfate crystallization test for soundness of aggregates to be presented at Highway Research Board Meeting, December, 1936. Cooperative investigation involving Los Angeles and Deval abrasion tests has been undertaken. No report available.

Masonry Materials

Weathering Characteristics of Masonry Materials.—Study of the weathering characteristics of such masonry materials as brick, concrete, hollow masonry building units, slate and building stone.

Committee C-3 on Brick presented a report on weathering and porosity of brick with papers by D. E. Parsons on "Comparison of Natural Weathering with Laboratory Tests of Clay Brick," and by J. W. McBurney on "The Relation of Freezing and Thawing Resistance to Physical Properties of Clay and Shale Building Brick," see *Proceedings,* Vol. 35, Part I, pp. 243, 252 and 247 (1935). Current report contains paper by J. W. McBurney on "Water Absorption of Building Brick," see preprint, 1936 Report of Committee C-3.

NOTE.—The work of Committees C-3, C-9, C-10 and C-18 in the study of weathering characteristics and development of accelerated weathering tests is being coordinated through the Coordinating Committee on Weathering Characteristics. Symposium on Weathering Characteristics of Masonry Materials held in 1931, see *Proceedings,* Vol. 31, Part II, p. 715 (1931).

Concrete

Studies of Designing and Proportioning of Concrete (Committee C-9).—Analyzing the existing data on various theories of preparing concrete mixtures and of developing a recommended procedure for the design or determination of a concrete mixture on the basis of strength and workability. Not yet reported upon.

Studies of Concrete Aggregates (Committee C-9).—A study of the various properties of aggregates for concrete, including soundness, resistance to abrasion, absorption and influence of shape, fineness and soft particles on quality of concrete; also freezing and thawing tests. Tests developed for soundness of aggregates and for absorption of aggregates (field and laboratory methods), see *Proceedings*, Vol. 33, Part I, p. 286 (1933). See also papers (not preprinted) appended to 1936 Report, "Studies on Relation Between Characteristics of Blast-Furnace Slag and Other Coarse Aggregates and Properties of Resultant Concretes" by Fred Hubbard, and "Progress Report on Studies of Sodium and Magnesium Sulfate Soundness Tests" by Stanton Walker and C. E. Proudley, see *Proceedings*, Vol. 36, Part I (1936).

Workability of Concrete (Committee C-9).—A study of the significance and methods of determining workability of concrete. See *Proceedings*, Vol. 29, Part I, p. 297 (1929). Recent work not yet reported.

Admixtures in Concrete (Committee C-9).—A general study of admixtures which may be added to concrete for the purpose of improving some of its properties. Progress report, see *Proceedings*, Vol. 29, Part I, p. 305 (1929), containing a summary of manufacturers' data on various commercial admixtures. Recent work not yet reported.

Elastic Properties of Concrete (Committee C-9).—Studies of the elastic properties of concrete of different mixtures at different ages under different conditions of moisture, the effect of different aggregates, a determination of the modulus of elasticity of concrete in tension, establishment of Poisson's ratio, and of the effect of application of loads, type of bearing, sensitivity of measuring devices, etc. See paper by R. E. Davis, H. E. Davis and J. S. Hamilton on "Plastic Flow of Concrete Under Sustained Stress," *Proceedings*, Vol. 34, Part II (1934). "Methods of Test for Determining Volume Changes in Concrete" prepared by R. E. Davis, see *Proceedings*, Vol. 35, Part I, p. 298 (1935). Current report contains paper on "Shrinkage of Gravel and Haydite Concrete" by F. E. Richart and J. E. Keranen, see preprint, 1936 Report of Committee C-9.

Permeability of Concrete (Committee C-9).—Study of the literature followed by studies of various methods and apparatus including the significance of permeability and absorption of concrete and the value of blended cements in reducing permeability. See "A Study of the Permeability of a Few Integrally Waterproofed Concretes" by W. M. Dunagan and G. C. Ernst, *Proceedings*, Vol. 34, Part I, p. 383 (1934). See 1936 paper on "Apparatus and Technique for the Concrete Permeability Tests of the Bureau of Reclamation" by E. N. Vidal and G. A. Samson (not preprinted), *Proceedings*, Vol. 36, Part I (1936).

Conditions Affecting Durability of Concrete in Structures (Committee C-9).—Study of the conditions under which concrete has not been durable. It will emphasize the precautions which must be taken to produce good concrete, whether in methods, material or workmanship. Studies of freezing and thawing tests, methods for measuring the durability of concrete, and effects of admixtures and volume change on durability. For report on the examination of concrete structures in Ontario and Quebec together with observations and conclusions, see *Proceedings*, Vol. 30, Part I, p. 686 (1930). See paper by B. Kellam on "The Action of Water on Concrete," *Proceedings*, Vol. 33, Part I, p. 289 (1933).

Effect of Speed of Testing on Concrete (Committees C-9 and E-1).—Investigative studies on the effect of varying the speed of testing upon the strength and elastic properties of concrete. Tests carried out at University of Illinois. For report on present series of tests, see paper by Paul G. Jones and F. E. Richart entitled, "The Effect of Testing Speed on Strength and Elastic Properties of Concrete," issued as reprint. This investigation is being continued to study the effect of various variables upon speed-strength and speed-stiffness relations, with particular attention to the phenomenon of inelastic short-time and long-time creep of concrete.

Deleterious Substances in Concrete (Committee C-9).—A study of the various naturally or accidentally occurring materials in concrete which may affect it deleteriously. Includes study of oil bearing aggregates and effect of pulverized material occurring as a coating on aggregate particles. See abstract of unpublished paper by C. L. Ford on "Comparison of Standards for Colorimetric Test for Sand," *Proceedings*, Vol. 34, Part I, p. 381 (1934). Test method for determining coal and lignite in sand developed, see preprint, 1936 Report of Committee C-9.

Curing of Concrete (Committee C-9).—Coordination and study of results of investigations of the curing of concrete looking ultimately to recommended methods of practice or specifications for curing. Five specifications adopted for various types of curing concrete. Specifications also adopted for sodium silicate for curing. Present studies include development of laboratory method for determining the efficiency of a curing material. No report available.

Paint and Paint Materials

Accelerated Tests for Protective Coatings (Committee D-1).—A study of accelerated weathering tests for such protective coatings as house paints, enamels, varnishes, lacquers and metal protective finishes; also correlation of the results with outdoor exposure tests. Specifications prepared for wood panels used in weather tests of paints and varnishes.

Current report (not preprinted) records results of two series of accelerated weathering tests on 6 varnishes applied on primed steel panels. First series included tests by 5 laboratories using 7 types of machines; second series covers tests by 6 laboratories on the 4 most satisfactory machines together with exterior exposures at 3 locations. Kauri reduction and photochemical embrittlement tests were also made. Report includes integrity rating of test panels and order of durability rating of the varnishes studied. See *Proceedings* Vol. 36, Part I (1936).

Anti-Corrosive and Anti-Fouling Paints (Committee D-1).—Study of the value of various anti-corrosive and anti-fouling paints. Two series of tests reported, see *Proceedings*, Vol. 27, Part I, p. 430 (1927). Further studies to include exposure tests in tropical waters. As a result of investigations, standard specifications for the toxic ingredients in anti-fouling paints, and methods of routine analysis of dry cuprous oxide and of dry mercuric oxide were adopted, see 1936 Book of A.S.T.M. Standards, Part II. Information on underwater exposure tests of marine paints containing a tung oil vehicle presented in a paper before Paint and Varnish Division of American Chemical Society, March, 1934.

Study of Hiding Power and Tinting Strength of Paint Pigments and Paints (Committee D-1).—Scope of investigation covered by title. See "Report of Cooperative Work on the Determination of Hiding Power of Wet Paints," and method of test for comparative hiding power of paints, *Proceedings*, Vol. 32, Part I, pp. 386 and 745 (1932). See discussion on tinting strength by J. W. Ayers on "A Discussion of the Accuracy and Utility of Methods of Test for Mass Color and Tinting Strength of Dry Color Pigments"; G. F. A. Stutz on "The Tinting Strength of White Pigments"; and R. H. Sawyer on "Tinting Strength of White Pigments," *Proceedings*, Vol. 34, Part II, pp. 497, 521 and 515 (1934). Test procedures adopted for tinting strength of white pigments and pastes and for mass color and tinting strength of dry color pigments and pastes, see 1936 Book of A.S.T.M. Standards, Part II; see also preprint, 1936 Report of Committee D-1. Studies being made of a new method for hiding power of paints, working at incomplete hiding and on a dry film basis.

Rubber Products

Abrasion Test for Rubber Products (Committee D-11).—Consideration of abrasion tests for application to those rubber products where abrasion in service is the most important element in determining the life of the material, such as conveyor belting, automobile tires, rubber-covered air and water hose, rubber heels, etc. Procedures covering the six most widely used tests for abrasion resistance of rubber compounds issued as tentative, see *Proceedings*, Vol. 34, Part I, p. 1150 (1934). Work being done to establish standard rubber test specimens having certified and tested properties for use as a reference base in testing, see preprint, 1936 Report of Committee D-11.

Vibration Absorption of Rubber Products (Committee D-11).—Study, development and standardization of methods of test which are particularly suitable in the evaluation of rubber stocks for shackles, motor supports, bumpers and shock insulators. Studying effect of repeated compression on rubber compounds and flow

properties of rubber. Method of test for compression set of vulcanized rubber used for vibration absorption covering procedures for compression set under constant load and constant deflection, respectively, issued as tentative, see preprint, 1936 Report of Committee D-11.

Properties of Rubber and Rubber-Like Materials in Liquids (Committee D-11).—Study of volume changes of rubber compounds when subjected to the action of oils or various solvents and the development of suitable test methods for comparing the swelling properties. See paper by O. M. Hayden, "The Testing of Rubber and Rubber-Like Materials for Oil Resistance," *Proceedings*, Vol. 34, Part II, p. 635 (1934). Determination of suitable shape and size of test specimens for a standard test being studied by five cooperating laboratories, see *Proceedings*, Vol. 35, Part I, p. 427 (1935).

Boiler Feedwater

Studies of Boiler Feedwaters (Joint Research Committee under Joint Sponsorship of Six Societies).—Investigative research on boiler feedwaters including studies of coagulation and sedimentation, foaming and priming, organic chemicals in water treatment, electrolytic prevention of scale and corrosion, effects of treated water in accelerating or relieving corrosion, and effect of solution composition on cracking of boiler metal. Current research work reported in papers by A. H. White, D. W. Button and C. H. Leland, "The Determination of Oxygen in Boiler Water"; W. C. Schroeder, A. A. Berk and E. P. Partridge, "Effect of Solution Composition on the Failure of Boiler Steel Under Static Stress at 250 C."; and by W. C. Schroeder, A. A. Berk and E. P. Partridge, "The Use of Solubility Data to Control the Deposition of Sodium Sulfate or Its Complex Salts in Boiler Waters," see preprints of papers, 1936.

Part II—Research on Methods of Testing

Ferrous and Non-Ferrous Metals

Tests of Galvanized Coatings (Committee A-5).—Extensive studies on tests for determining weight and uniformity of zinc coatings on hardware and irregularly shaped articles. Method for determining uniformity of coating by the Preece test (copper sulfate dip) on zinc-coated (galvanized) iron or steel wire developed, see reprint, 1936 Report of Committee A-5.

Alternating Current Tests of Magnetic Materials at Low Inductions (Committee A-6).—Tests of magnetic materials used in apparatus operating at high frequencies (audio frequencies) and low inductions, such as core materials for audio-frequency transformers, chokes, etc. Studies have resulted in revision of methods of test for magnetic properties of iron and steel, see preprint, 1936 Report of Committee A-6. Further study being given to problems relating to a-c tests for permeability and core loss at low and high inductions; also to magnetic drift with time as result of demagnetization.

Tests at High Magnetizing Forces (Committee A-6).—Development of test methods operating at high magnetizing forces in order to test materials such as the new permanent magnet materials which have coercive forces of several hundred oersteds. The saturation permeameter and the simplex Super-H Adapter have been incorporated in the revised standard methods of test for magnetic properties, see preprint, 1936 Report of Committee A-6.

Core Loss Tests of Electric Sheet at High Inductions (Committee A-6).—Study of tests for core loss of laminated materials at inductions higher than 14 kilogausses. Round-robin tests on 10-kg. samples at various inductions from 10 to 16 kilogausses have resulted in adoption of an induction for core loss tests of 15 kilogausses, see preprint, 1936 Report of Committee A-6.

Life Test for Durability of Electrical-Resistance Wire at High Temperatures (Committee B-4).—To arrive at the best methods for determining the durability of resistance wire at high temperatures with due regard to service conditions. Standard accelerated life test adopted. Comparative laboratory tests for heater wires for electrical appliances, 80 per cent nickel and 20 per cent chromium alloy, at temperatures of 1950, 2000 and 2050 F., have resulted in revisions of standard method, see preprint, 1936 Report of Committee B-4. Method of test being developed for life test for heater elements for operation in electric furnaces.

Electrical Tests of Heating and Resistance Alloys (Committee B-4).—Studies of methods of test for thermoelectric power of materials and for temperature coefficient of resistance are being carried on. Standard methods adopted for thermoelectric power, resistivity of, change of resistance with temperature, and temperature-resistance constants of resistance alloys. Test being developed for temperature coefficient of sheet resistance material (manganin), see preprint, 1936 Report of Committee B-4.

Elastic Properties of Electrical-Resistance Alloys (Committee B-4).—A study of the elastic properties of electrical-heating, electric-resistance and electric-furnace alloys at temperatures up to 1000 C. A study is being made of a special bend test described by Howard Scott, "High-Temperature Characteristics of Metals Revealed by Bending," *Proceedings*, Vol. 31, Part II, p. 129 (1931).

Mechanical Tests of Heating and Resistance Alloys (Committee B-4).—Investigations of tests for determining stiffness of electrical resistance wires. Proposed method for the bend testing of wire covering three types of machines in which stiffness is measured by angle of permanent bend of specimen published as information, see preprint, 1936 Report of Committee B-4.

Studies of Heating and Resistance Alloys at High Temperatures (Committee B-4).—Tests for thermal conductivity, tests for thermal coefficient of linear expansion, and a study of warpage to determine its relation to thermal expansion and heat conductivity. Test developed for linear expansion of metals, see *Proceedings*, Vol. 34, Part I, pp. 244 and 733 (1934). Consideration also being given to oxidation, corrosion, bend, and compression tests at high temperatures, see preprint, 1936 Report of Committee B-4.

Tests for Evaluating Thermostatic Metals (Committee B-4).—Survey of methods of test for "thermoflex" (thermostatic metals); also preparation of units and definitions of terms used in connection with the specifying and testing of these metals. Test for flexivity (flexure-temperature characteristics) of thermoflex developed, see preprint, 1936 Report of Committee B-4.

Tests of Anodic Oxidation of Aluminum and Aluminum Alloys (Committee B-7).—Study of methods of tests for anodized coatings and the ability of such coatings to withstand various service conditions. No report available.

Cement

Chemical Analysis of Cement (Committee C-1).—Study of improved and shorter methods for chemical analysis of cement. Present studies include tests for manganese and phosphorous in portland cement. Proposed procedures for determining phosphorous and manganese in cement, published as information, see preprint, 1936 Report of Committee C-1.

Time of Setting of Portland Cement (Committee C-1).—Development of an improved method for determining time of setting of cement. Data being accumulated from 8 laboratories on 5 methods, including A.S.T.M. standard method for normal consistency, time of setting using Gilmore and Vicat needles, normal consistency of plastic mortar method and proposed method of penetration-time relation, see preprint, 1936 Report of Committee C-1.

Lime

Determination of Soundness of Lime (Committee C-7).—Study of a new method for determining soundness of lime, particularly adapted to lime used for plastering. Experimental work at National Bureau of Standards resulted in development of autoclave test for soundness of lime issued as tentative method, see *Proceedings*, Vol. 34, Part I, p. 754 (1934). Several alternative test methods are under consideration.

Determination of Plasticity of Hydrated Lime (Committee C-7).—Further investigative study of Society's method for determining the plasticity of hydrated lime. Improved test procedure issued as tentative, see *Proceedings*, Vol. 34, Part I, p. 754 (1934).

Refractories

Abrasion of Refractories at High Temperatures (Committee C-8).—Substantially as stated by title. Review of literature on

abrasion tests of refractories has been completed preparatory to undertaking laboratory work. No report available.

Load Test of Insulating Refractories (Committee C-8).—A study of methods for performing load, reheat and flexure tests on insulating fire brick. No report available.

Cold Crushing of Fire-Clay Brick (Committee C-8).—Investigation of crushing strength of fire-clay brick in three directions, namely, flat, on edge and endwise, to obtain data for developing a cold-crushing test. Flexural strength and porosity also determined in order to study what relation, if any, exists between these properties. Not yet reported upon.

Pyrometric Cone Equivalent (P.C.E.) Test for Refractories (Committee C-8).—Investigation of uniformity and dependability of P.C.E. results obtained with air-gas, oxygen-acetylene and granannular carbon resistance furnaces in order to standardize the furnace for making P.C.E. determinations. Study being made of rate of heating in P.C.E. test, and on variations in sizes of pyrometric cones. For discussion by F. A. Harvey of "P.C.E. *versus* Fusion Point," see *Proceedings*, Vol. 34, Part I, p. 376 (1934).

Slagging of Refractories (Committee C-8).—Study of modified Hursch slag tests on several brands of brick, including observations of effects of slagging on these brick in service. Work under way, no report available.

Service Spalling Test of Refractories (Committee C-8).—Study of a service spalling test for refractories that will measure resistance to a variety of factors causing spalling, such as vitrification produced by time, temperature and slag coatings and to learn the effect of varying the temperature and rate of cooling. Two panel test methods adopted for resistance of refractory brick and of high heat duty fire-clay brick to thermal and structural spalling. Panel test for super duty fire-clay brick issued as tentative, see preprint, 1936 Report of Committee C-8.

Microstructure and Petrographic Studies of Refractories (Commitee C-8).—Preparation of recommendations for standard procedure in the petrographic examination of certain types of refractory brick, to include selection and preparation of samples, examination for grain size, form of silica present and similar observations and evaluation of type of examination. No report available.

Heat Transfer of Refractory Materials (Committee C-8).—Study of methods of determining and of expressing thermal conductivity. Studies will be made not only on high-temperature refractories but also on materials commonly classed as heat insulators. To formulate standards to measure the different physical properties of refractory heat insulating materials in addition to their characteristic property of retarded heat transfer. Methods of testing high-temperature heat insulation developed, see *Proceedings*, Vol. 33, Part I, p. 279 (1933). Critical study of test methods now being made. Symbols for heat transmission issued as tentative, see *Proceedings*, Vol. 34, Part I, p. 807 (1934). See also preprint, 1936 Report of Committee C-8.

Concrete

Methods of Analyzing Concrete (Committee C-9).—Development of test methods for the quantitative determination of the constituents of concrete. Method adopted for determination of the cement content of hardened concrete. Proposed draft of Dunagan method of field determination of the constituents of fresh concrete published as information, see *Proceedings*, Vol. 31, Part I, pp. 362, 383 (1931). See also paper by H. R. Nettles and J. M. Holme, "A Study of the Analysis of Fresh Concrete with the Dunagan Buoyancy Apparatus," *Proceedings*, Vol. 33, Part I, p. 297 (1933).

Field Tests for Concrete (Committee C-9).—Standardization of methods of making field specimens, including sampling of the concrete when soft, the methods of sampling hardened concrete, and the development of field tests for concrete. Study of relation between the strengths of test specimens of different forms and dimensions. Relation between the compressive strength of test cylinders made in accordance with the A.S.T.M. standard method and prisms removed from slabs of the same mix. Methods of testing vibrated concrete and an accelerated compression test being studied. Recent work not yet reported. Current report contains test method for flow of portland-cement concrete by use of flow table, see preprint, 1936 Report of Committee C-9.

Paint and Varnish

Physical Properties of Paint Materials (Committee D-1).—Study of the physical properties connected with paints and paint materials. Viscosity and plasticity of paints, color and optical properties of paints and paint materials have been considered. Methods of analysis for the color characteristics of paints have been adopted. Present work on study of "gloss" includes (1) preparation of a precise scientific definition of gloss that will be clearly understood and of use commercially, (2) investigation of the relative merits of all instruments and apparatus that are commercially available, upon which satisfactory gloss determinations can be made, and (3) to obtain information and data for the development of a satisfactory gloss specification and method of test, see preprint, 1936 Report of Committee D-1.

Tests of Bituminous Coatings for Underground Pipe Protection (Committee D-1).—Substantially as covered by title, particularly the development of satisfactory test for adhesion and a method of testing the durability of these and other paint coatings, and data based on such tests. For statement on principles of testing paints and combinations of paints on steel panels, see *Proceedings*, Vol. 35, Part I, p. 322 (1935).

Properties and Tests of Varnishes (Committee D-1).—Studies of the physical and chemical properties of varnishes including tests for adhesion, color, method for determining reactivity of varnishes, methods of evaluating failure of varnishes upon exposure and effects of temperature, humidity and other factors upon physical properties of varnishes. See preprint, 1936 Report of Committee D-1. Procedures developed for skinning test, alkali resistance and determining acid number of oleo-resinous varnishes, see *Proceedings*, Vol. 35, Part I, pp. 319 and 887 (1935).

Shellac (Committee D-1).—General studies of properties and methods of tests of shellac and shellac varnish. Angelo color method being studied; methods for determining water-soluble material in non-volatile shellac varnishes to be developed, see preprint, 1936 Report of Committee D-1.

Naval Stores (Rosin)

Properties and Tests for Rosin (Committee D-17).—Study, development and standardization of following tests for rosin: viscosity, crystallization, size-making value and alum test, acid and saponification number, unsaponifiable matter, and darkening and volatile matter upon heating. Study of methods for determining crystallization tendency of rosin reported, see *Proceedings*, Vol. 34, Part I, p. 546 (1934). Data so far obtained in applying falling-ball viscosity method to rosin included in 1935 report, see Vol. 35, Part I, p. 477 (1935). Current report records progress, see preprint, 1936 Report of Committee D-17.

Petroleum Products and Lubricants

Melting Point of Grease (Committee D-2).—The pressure-flow relationship of greases at various temperatures, approaching what is commonly known as the melting point, is being studied. Progress reported, see preprint, 1936 Report of Committee D-2.

Oxidation at High Temperatures (Committee D-2).—Study of a high-temperature oxidation test whose function is to produce in an oil, as rapidly as possible, changes of the same kind as would normally take place during long periods of actual service. Study of reproducibility of Sligh oxidation test. Two series of tests already carried out with the Sligh oxidation equipment, see *Proceedings*, Vol. 28, Part I, p. 457 (1928). Results reported of series of tests on three different oils; also test method for oxidation number of lubricating oils by Sligh method published as information, see *Proceedings*, Vol. 35, Part I, pp. 333 and 335 (1935).

Corrosion Tests for Lubricating Oils (Committee D-2).—Substantially as covered by title. Present program involves development of laboratory test methods which will correlate with road service. Consideration being given to laboratory corrosion tests in which the bearing metal is heated in the lubricant under test at an elevated temperature for a definite period of time and laboratory bearing tests in which bearings are operated at loads, speeds and temperatures comparable to service. See *Proceedings*, Vol. 35, Part I, p. 328 (1935).

Flash Point (Committee D-2).—Development of a flash point method for viscous liquids, especially cut-back asphalts and suspensions of solids. Procedure completed and incorporated in standard test for flash point by means of Pensky-Martens closed tester, see 1936 Book of A.S.T.M. Standards, Part II, p. 897.

Gum in Gasoline (Committee D-2).—Investigative study of determining gum in gasoline by various methods and behavior of fuels in service; also the gum stability of gasoline. Work on gum stability recently undertaken includes studies of various bomb tests and the copper dish method. See *Proceedings,* Vol. 34, Part I, p. 435 (1935). Procedure for gum content of gasoline adopted, see 1936 Book of A.S.T.M. Standards, Part II, p. 935.

Vapor Lock of Motor Fuels (Committee D-2).—Study of vapor-locking characteristics of motor fuels. An attempt being made to correlate data obtained by method of test for vapor pressure of natural gasoline (Reid method) with vapor-locking characteristics. See *Proceedings,* Vol. 34, Part I, p. 438 (1934); also papers by G. G. Brown on "Motor Fuels and Vapor Lock" and by T. A. Boyd on "Motors and Fuel Vapor Pressure," Vol. 34, Part II, pp. 550 and 540 (1934).

Evaluation of Crude Petroleum (Committee D-2).—Study and development of apparatus and procedures for the more or less complete evaluation of crude petroleum. Determination of gravity of crude petroleum on dry (water-free) basis. Not yet reported upon.

Classification of Transmission Lubricants and Automotive Greases (Committee D-2).—An attempt is being made to determine the relationship between viscosity of transmission lubricants under pressure and gear shifting in cold weather; also classification of automotive greases based upon consistency and viscosity of mineral oil content. No report available.

Kinematic Viscosity Tests (Committee D-2).—Study of methods for determining kinematic viscosity of any petroleum product or lubricant which is a true viscous liquid at the temperature of the test. Two proposed methods using the suspended level and modified Ostwald instruments, respectively, published as information; also a method of converting kinematic viscosity to Saybolt Universal viscosity, see 1936 reprint pamphlet, "A.S.T.M. Standards on Petroleum Products and Lubricants."

Neutralization Number of Petroleum Products and Lubricants (Committees D-2 and D-9).—Cooperative study of potentiometric methods for determination of acidity of oils. Draft of proposed method published as information, see compilations of "A.S.T.M. Standards on Petroleum Products and Lubricants" or "A.S.T.M. Standards on Electrical Insulating Materials" (September, 1936).

Bituminous Materials

Method of Separation of Cut-Back Asphalt (Committee D-4).—Studies of various methods for the separation of cut-back asphalts to determine the amount and character of the base and cut-back. Extensive investigations included studies of atmospheric distillation, steam distillation and vacuum distillation methods. Test for separation of liquid asphaltic products adopted, see 1936 Book of A.S.T.M. Standards, Part II.

Tests of Bituminous Emulsions (Committees D-4 and D-8).—Investigations of testing methods for bituminous emulsions for use on roads and also emulsions used for waterproofing generally, whether vertical or horizontal, and with or without membranes. General test procedures issued as tentative, additional procedures being developed for pliability, resistance to flow under heat, retention of adhesion and cohesion of emulsions when immersed in water. See *Proceedings,* Vol. 34, Part I, pp. 444, 483, 926 (1934).

Accelerated Weathering Tests of Bituminous Roofing Materials (Committee D-8).—Study of an electrical accelerated weathering test applicable to roofing. Information on radiant energy of alternating-current lamps and direct-current lamps reported; also proposed draft of an accelerated weathering test for bituminous materials published as information, see *Proceedings,* Vol. 33, Part I, pp. 379, 381 (1933). Further data obtained on effect of accelerated weathering cycle as compared with outdoor weathering, see *Proceedings,* Vol. 35, Part I, p. 397 (1935). Studies of interest in this work are described in paper by O. G. Strieter entitled, "The Effect of Mineral Fillers on the Serviceability of Coating Asphalts," issued as preprint, 1936.

Tests of Bituminous Joint Compounds for Sewer Pipe (Committee D-8).—Substantially as covered by title. Consideration being given to pressure tests and methods for determining solvent action of sewage on bituminous sewer joint compounds. Work being carried on at University of Illinois, see paper by J. S. Crandell on "Bituminous Joint Compounds for Sewer Pipe," *Proceedings,* Vol. 34, Part II, p. 581 (1934).

Tests for Mineral Surfacing Materials on Roofing (Committee D-8).—Development of tests designed to test the effectiveness of imbedding of granular mineral surfacing in the asphalt coating of the weather surface of asphalt-prepared roofing and shingles. Series of cooperative tests with three types of machines described in paper by H. W. Greider and G. A. Fasold on "A Comparison of Abrasion Test Methods for Imbedding of Granular Mineral Surfacing on Asphalt Roofing," see preprint, 1936 Report of Committee D-8.

Tests for Bituminous Coatings for Cold Application (Committee D-8).—Development of tests for identification and evaluation of cold application bituminous coatings employed for dampproofing and waterproofing purposes. Several methods of determining waterproofness being studied, see preprint, 1936 Report of Committee D-8.

Analytical Methods for Bituminous Saturated Fabrics for Waterproofing (Committee D-8).—Study of improved methods for testing felted and woven fabrics for use in waterproofing and roofing, including the determination of the saturants in felts and fabrics saturated with coal-tar materials containing free carbon; also those saturated with coal tar and surfaced with talc, mica, or similar materials; see preprint, 1936 Report of Committee D-8.

Timber

Moisture in Timber (Committee D-7).—Consideration of methods for making two types of moisture determinations applicable to timber, the first an accurate method for laboratory use and the second a method sufficiently accurate and practical for field use. Proposed draft of method for determination of moisture in timber for use in the laboratory published as information, *Proceedings,* Vol. 29, Part I, p. 422 (1929). Study made of application of electrical measurements to heavy timber, see *Proceedings,* Vol. 33, Part I, p. 362 (1933). Current report contains data on use of steam pipe oven for moisture content determinations, see preprint, 1936 Report of Committee D-7.

Gaseous Fuels

Tests for Gases Used as Commercial Fuels (Committee D-3).—Development and formulation of standard methods of procedure for the following determinations of gaseous fuels: calorific value, specific gravity, impurities, water vapor content, complete analysis or chemical composition, collection and measurement of samples, see preprint, 1936 Report of Committee D-3.

Coal and Coke

Sampling of and Tolerances for Coal (Committee D-5).—A series of sampling experiments to test the accuracy of the present standard method of collecting and reducing gross samples of coal. Experiments will consist of both hand and machine sampling methods and will be made on a number of different coals varying in size, and containing different amounts of impurities. Procedure for the mechanical crushing and reduction of gross samples of coal to convenient size for transmittal to the laboratory accepted for study, see compilation of "A.S.T.M. Standards on Coal and Coke" (September, 1936).

Agglutinating Value of Coal (Committee D-5).—Study of laboratory test for obtaining information regarding the coking and caking properties of coal. Experimental work by W. A. Selvig, B. B. Beattie and J. B. Clelland described in paper on "Agglutinating-Value Test for Coal," see *Proceedings,* Vol. 33, Part II, p. 741 (1933). Proposed draft of a method which is an approximate measure of that material in coal which fuses and becomes plastic on heating published as information, see *Proceedings,* Vol. 34, Part I, p. 457 (1934). Sands from different sources being investigated to determine their suitability for use as an inert material in the proposed method of test, see preprint, 1936 Report of Committee D-5.

Pulverizing Characteristics of Coal (Committee D-5).—Investigation of laboratory methods to determine comparative pulveriz-

ing characteristics of different coals in connection with their commercial pulverization as powdered coal. Coal grindability tests have been made at 5 laboratories, using different methods on a series of 5 coals of wide range in grindability varying from a friable semibituminous to a hard anthracite. As a result of these studies two test methods have been developed for grindability of coal, namely, the ball-mill and Hardgrove-machine methods, see *Proceedings,* Vol. 35, Part I, pp. 854, 857 (1935). Studies of methods described in two papers presented before Coal Division of American Institute of Mining and Metallurgical Engineers, February, 1936, see also preprint, 1936 Report of Committee D-5.

Friability of Coal (Committee D-5).—Investigation of method for determining resistance of coal to breakage on handling. Drafts of proposed methods of drop shatter test and tumbler test for coal completed, see compilation of "A.S.T.M. Standards on Coal and Coke" (September, 1936). Experimental work leading to development of methods described by R. E. Gilmore, J. H. H. Nicolls and G. P. Connel in Canada Department of Mines *Publication No. 762* (1935).

Dustiness of Coal and Coke (Committee D-5).—Investigative study of procedure for determination of dustiness of coal and coke based on method described in *Industrial and Engineering Chemistry,* by A. R. Powell and C. C. Russell, see preprint, 1936 Report of Committee D-5.

Electrical Insulating Materials

Tests of Insulating Varnishes (Committee D-9).—Investigation and development of the following methods for varnish films: Hardness and oil resistance; acid and alkali resistance; and insulation resistance. See preprint, 1936 Report of Committee D-9.

Tests of Saturant Varnishes (Committee D-9).—Studies of properties of saturant varnishes, such as impregnation, internal drying, bonding strength, and dielectric strength when the varnish is used as an impregnating medium in cotton fabrics. Work recently undertaken not yet reported upon.

Tests of Molded Insulating Materials (Committee D-9).—Investigation of methods of measuring impact fatigue of molded phenol plastics, and studies of dimensional tolerances suitable for phenol plastic impact test specimens and of the effect of moisture content on impact and transverse strength of phenol plastic test specimens. Investigation of the effect of the type of mold used on the physical strengths of plastic molded test specimens. Also tests for density and particle size of molding powders and plasticity and cure tests. Improvements in impact specimens completed, also methods of testing molding powders used in manufacturing molded electrical insulators developed, see *Proceedings,* Vol. 34, Part I, pp. 502, 1001 (1934). Program for determining effect of conditioning upon the properties of molded materials being carried on, see preprint, 1936 Report of Committee D-9.

Tests of Insulating Papers and Fabrics (Committee D-9).—Investigation and development of methods and apparatus for testing insulating papers, as follows: Tests for moisture in impregnated cable paper; acidity tests; oil penetration; air resistance of insulating paper and effect of humidity on dielectric strength of varnished cambric. Methods for thickness and folding endurance developed; also specifications and tests for varnished cloth tape and flexible tubing. For current progress see preprint, 1936 Report of Committee D-9.

Tests of Insulating Sheets, Tubes and Rods (Committee D-9).—The following studies of laminated sheet insulating materials are being conducted: Method for determining compressibility as a function of time; methods of measuring the modulus of elasticity in compression; the effect of temperature variations on water absorption; effect of humidity on dielectric strength and on flexural strength; impact fatigue tests, arc resistance, hardness tests, punching quality and insulation resistance tests; also methods of test for flammability and heat resistance. Indentation hardness test using Rockwell tester developed. For current progress see preprint, 1936 Report of Committee D-9.

Tests of Liquid Insulation (Committee D-9).—Development of tests primarily applicable to circuit breaker oils, such as the determination of gas formed during arc-over, measurement of carbon formed and precipitated during arc-over, and a test for amount of water precipitated or emulsified during arc-over; also low-temperature viscosities. Studies of the following tests of insulating oils: Neutralization value of both new and used oils; resistance of insulating oils to oxidation (sludge tests), tests for moisture content and for saponification value. For summary of four years' work on sludge tests, see paper by F. M. Clark and E. A. Snyder on "Testing for Sludge Formation in Mineral Transformer Oil," issued as preprint. See also preprint, 1936 Report of Committee D-9. Draft of potentiometric method for neutralization number published as information, see compilation of "A.S.T.M. Standards on Electrical Insulating Materials" (September, 1936). Test for saponification number (modified Baader method) issued as tentative, see preprint, 1936 Report of Committee D-9.

Tests of Insulating Compounds (Committee D-9).—Investigation of methods of test for solid filling and treating compounds used for electrical insulation, including: Coefficient of expansion; determination of insulation-resistance temperature characteristics; specimens and tests for dielectric strength; also viscosity tests of high melting asphaltic compounds. Procedures developed for measuring coefficient of expansion and for power factor and dielectric strength, see *Proceedings,* Vol. 34, Part I, pp. 494, 507, 965 (1934). See also preprint, 1936 Report of Committee D-9.

Power Factor and Dielectric Constant of Insulating Materials (Committee D-9).—Development and preparation of test methods for measuring dielectric constant and power factor of liquid insulation and of solid insulating materials. Extensively improved procedures completed for tests at 25 cycles to 1 megacycle, see preprint, 1936 Report of Committee D-9. Round-robin tests under way dealing with power factor measurements of liquid insulation. A special test cell is being constructed to be used by the cooperating laboratories.

Tests of Mica Products (Committee D-9).—Study of methods covering mica for capacitor manufacture and built-up pasted mica for general insulating purposes. Methods prepared for grading natural mica and tests for pasted mica. Round-robin test series in progress on power factor measurements of natural mica, see preprint, 1936 Report of Committee D-9.

Tests for Insulating Properties of Electrical Slate (Committee D-9).—Study of the properties of slate for use in electrical work. Two procedures for testing electrical slate for conducting paths or veins completed, see preprint, 1936 Report of Committee D-9.

Tests of Cable Oils (Committee D-9).—Studies and development of tests for cable oils, including sampling and conditioning of samples; aging and oxidation of cable oils primarily to study electric stability of aged and oxidized oils; power-factor, dielectric-constant and resistivity tests of cable oils; volumetric gas content of insulating oils, and viscosity determinations. See *Proceedings,* Vol. 35, Part I, p. 404 (1935).

Tests for Properties of Glass for Electrical Purposes (Committee D-9).—Comprehensive study of mechanical and electrical tests for evaluating the characteristics of glass for electrical insulating purposes. Mechanical and physical properties to be studied include: tensile, compressive, flexural and shearing strength, torsion, impact, elasticity hardness, thermal expansion and shock, weathering and corrosion, water solubility, chemical durability, and visibility. Electrical properties to be considered include: dielectric constant, power factor, volume resistivity as function of temperature, surface resistivity as function of humidity, and previous weathering treatment, dielectric breakdown as function of frequency, of impulse, of thickness, and of temperature. Study of many difficult problems involved in project undertaken recently. No report available.

Rubber Products

Life Test for Rubber Products (Committee D-11).—Accelerated aging tests of various types of rubber compounds in comparison with natural aging of the same samples. Methods of test for accelerated aging of vulcanized rubber developed, see *Proceedings,* Vol. 35, Part I, p. 1167 (1935). Method of test for effect on rubber compounds of air at elevated pressures and temperatures now being studied, see preprint, 1936 Report of Committee D-11.

Dynamic Fatigue Testing for Rubber Products (Committee D-11).—To study the general field indicated in title and particularly as applied to repeated extension, compression, bending and similar tests. Studying separation tests on plied rubber and fabric

materials. Methods including three different types of apparatus and procedures for flexing tests of rubber products developed, see *Proceedings,* Vol. 35, Part I, p. 1186 (1935).

Adhesion of Rubber to Metal (Committee D-11).—Study, development and standardization of methods for measuring the adhesive strength of rubber to metal with particular reference to such applications in the automotive industries. Methods of test for adhesion of vulcanized rubber to metal developed, see *Proceedings,* Vol. 35, Part I, p. 1180 (1935).

Textile Materials

Methods of Testing Raw Cotton (Committee D-13).—Based upon fundamental research of cotton fiber quality such as that of the cotton fiber laboratories of the U. S. Bureau of Agricultural Economics, on studies of length, strength, fineness, maturity and color of raw cotton, work is being undertaken on specifications and suitable methods of measurement. General test methods for determining length, length distribution, fineness immaturity count and strength of cotton fibers developed; see compilation of "A.S.T.M. Standards on Textile Materials" (October, 1936). New and improved methods for measuring fiber properties under consideration. For titles of papers relating to raw cotton presented recently at meetings of Committee D-13, see preprint, 1936 Report of Committee D-13.

Tests of Rayon Fabrics (Committee D-13).—Studies of tension test for wet specimens, cloth fraying test, washability or launderability test; also methods to determine pulling at seams, slippage of fabrics, and oil and moisture contents of oiled rayons. Methods developed for identification of different types of rayon, for strength of rayon woven fabric when wet, for shrinkage in laundering and test for slippage of woven rayon broad goods; see compilation of "A.S.T.M. Standards on Textile Materials" (October, 1936). Work planned on performance tests for unraveling and fraying of rayon fabrics, see preprint, 1936 Report of Committee D-13.

Tests of Silk Textiles (Committee D-13).—Methods completed for shrinkage in laundering of silk woven broad goods; also for yarn slippage in silk and silk-rayon woven broad goods; and for fastness of dyed or printed silk fabrics to laundering or domestic washing; see compilation, "A.S.T.M. Standards on Textile Materials" (October, 1936).

Magnetic Iron Content of Asbestos (Committee D-13).—Studies are contemplated to determine the amount of magnetic iron in asbestos; also the electrical resistivity of asbestos tapes. No report available.

Tests of Wool and Its Products (Committee D-13).—Substantially as covered by title. Present considerations cover tests for felt, a wear test procedure for pile floor coverings and test methods for woolen and worsted fabrics. Method of test for woolen and worsted yarns have been issued; also tests for estimating fineness of wool in loose form, methods for testing pile floor coverings, procedure for estimating scoured content of grease wool, and a draft of proposed methods for wool felt, see compilation of "A.S.T.M. Standards on Textile Materials" (October, 1936). For current progress, see preprint, 1936 Report of Committee D-13.

Tests for Bleaching, Dyeing and Finishing of Textiles (Committee D-13).—Methods of test developed for fastness of dyed or printed cotton fabrics, and dyed or printed silk or rayon fabrics to laundering or domestic washing, see compilation of "A.S.T.M. Standards on Textile Materials" (October, 1936). Consideration being given to a method for determining amount of sizing and finishing materials in cotton fabrics, a test for the fastness of dyed fabrics to light and test methods for textile chemicals. See preprint, 1936 Report of Committee D-13.

Industrial Waters

Methods of Analysis of Industrial Waters (Committee D-19).—Substantially as covered by title. Consideration being given to proposed methods for determination of chloride, calcium, and magnesium ions in waters for industrial uses. Program contemplates tests for determination of silica, sodium, ferrous and ferric, and aluminum ions. Drafts of proposed methods for the sulfate, hydroxide carbonate and orthophosphate ions when present in industrial waters, edited and based upon methods developed by Subcommittee 8 of the Joint Research Committee on Boiler Feed Water Studies, published as information, see special reprint pamphlet, October, 1936.

Miscellaneous Subjects

Study of Very Finely Sized Material (Committee E-1).—Development of methods of procedure for particle size determination of particulate substances, such as powdered coal, cement, pigments, by means of liquid elutriation and direct microscopic observation using filar micrometer. Microscopic method of particle size determination developed, see *Proceedings,* Vol. 33, Part I, p. 989 (1933). See also paper by H. H. Hatch on "The Importance and the Determination of Particle Sizes of Hydraulic-Fill Dam Materials," *Proceedings,* Vol. 34, Part II, p. 739 (1934). 1935 report describes cooperative series of tests on particle size measurement by the microscopic count method; also a proposed method of measurement of average particle diameter of sub-sieve particulate substances by dark field methods, see *Proceedings,* Vol. 35, Part I, p. 497 (1935).

A General Study of Methods of Determining Consistency and Plasticity (Committee E-1).—The committee is cooperating with various agencies in the development of suitable standards for viscosity. Consideration being given to the fundamental conceptions of the definition of viscosity and methods of determining viscosity in absolute units. Definitions of "consistency" and "plasticity" developed. New method of test developed for softening point by ring and ball apparatus which in addition to testing bituminous materials is applicable to rosins and most resins, both natural and synthetic, see preprint, 1936 Report of Committee E-1.

Annual Tables of Constants

THE Society has just received for its library at Headquarters, a copy of Part II, Volume X of the Annual Tables of Constants and Numerical Data, published under the patronage of the International Council of Scientific Unions and the International Union of Chemistry. Part II supplements the previous volume receipt of which was announced in an earlier BULLETIN. These annual tables, beginning with the first volume issued in 1910, have made available original numerical data appearing in the world's literature with complete references. No other work in existence gives such a complete record of all constants and data. Through these volumes a wealth of material is at the disposal of chemists, physicists, biologists, engineers and technical directors. The latest volumes are published in both English and French.

Complete sets of the first series 1910-1922 are available with index, and the second series extends from 1923 through 1930. Complete information concerning these volumes can be obtained from McGraw-Hill Book Co., Inc., agents for United States and Canada, or from Dr. Charles Marie, General Secretary, International Committee, 9 rue de Bagneux, Paris (VI°), France.

Suspended Level Viscosimeter

THERE was issued on July 21, 1936, to Dr. Leo Ubbelohde, of Germany, U. S. Patent No. 2,048,305, which is of considerable interest in connection with the Society's "Proposed Method of Test for Kinematic Viscosity by Means of the Suspended Level Viscosimeter," published for information in the 1936 Report of Committee D-2 on Petroleum Products and Lubricants. (See also "A.S.T.M. Standards on Petroleum Products and Lubricants," September, 1936.) Doctor Ubbelohde has indicated his willingness to grant licenses to U. S. manufacturers of this type of viscosimeter.

On the Increase

THE latest reports on Society membership growth are distinctly encouraging and the indications are that 1936 will be one of the best years from the standpoint of net growth of the Society. The number of resignations and other losses is at about the average figure but the number of new members is considerably more than in any recent year.

A large number of the new members, both company and individual, who have become affiliated with the Society, have done so because they became interested in our work through their contacts with existing members. Many of our members have been membership conscious during the year and their efforts in obtaining new members have been very fruitful. The Executive Committee is appreciative of the efforts which have been made in the membership work.

Since this issue of the BULLETIN presents a complete review of all of the A.S.T.M. research projects, it is considered an especially good one to refer to a prospective member to indicate the breadth and intensity of this important phase of the Society's activities. Copies of the BULLETIN or reprints of the research article will be furnished any of the members should they wish to pass along their copy to some associate or friend.

Marburg Lecture Committee for 1937

THE committee which will select the Edgar Marburg Lecturer for 1937 has been appointed. Under the rules governing the lecture, this group consists of a member of the Executive Committee, a member of Committee E-9 on Research and a member of Committee E-6 on Papers and Publications. The personnel, representing the respective committees in the order named, is as follows: H. S. Vassar, *Chairman,* Laboratory Engineer, Public Service Electric and Gas Co.; J. S. Miller, Jr., Director, Technical Bureau, The Barber Asphalt Co.; and M. O. Withey, Professor of Mechanics, University of Wisconsin.

Lectures on Industrial Standardization

THE engineering and management aspects of industrial standardization are being discussed in a series of eight illustrated lectures being given by Dr. John Gaillard, member of the staff of the American Standards Assn. The lectures are given on Wednesday evenings in the Auditorium of Metal Products Exhibits, Inc., Rockefeller Center, New York City.

The first four lectures have covered such topics as essential functions of standardization, different types of standards, review of technical and management standards and tolerance standardization. Beginning with November 4, the remaining lectures cover the meaning of "quality," principles and technique of developing standards, organizing standardization work in an individual company, and present status of standardization as a function of executive management. The charge for attendance at single lectures is $1.50. Further details can be obtained from Room 807, 29 West 39th St., New York City.

International Testing Congress Proceedings

THE Society has recently received a shipment of the Proceedings of the First Congress of the International Association for Testing Materials held in Zurich, Switzerland, in September, 1931. An agreement has been reached with the International Association whereby the Society is offering to its members and others in America who may be interested a copy of both parts of these Proceedings at the special price of $7.50. They were originally priced considerably higher than this.

The volumes are both extensive ones—Part I, including a large number of technical papers presented on the subject of metals and non-metallic inorganic materials (Groups A and B) comprises 1213 pages, and Part II made up of the papers on organic materials and questions of general importance (Groups C and D) covers 708 pages. Both volumes are bound in red cloth binding, page size 7¼ by 10½ in. A coated paper is used for the volumes.

It is not possible to list all of the numerous papers included in the volumes, but some idea of the extent of the papers and discussion of the respective subjects covered may be had from the following tabulation:

SUBJECT	PAGES COVERED
Group A	
Testing of Cast Iron	128
Strength of Metals at High Temperatures	56
Fatigue	152
Notched-Bar Impact Test	80
Progress of Metallography	99
Group B	
Natural Stone	72
Influence of Chemical Agents on Cement and Concrete	64
Portland Cements	116
Cements with Hydraulical Ingredients	150
Aluminous Cements	36
Concrete (Strength, Elasticity, Compactness)	110
Reinforced Concrete	138
Group C	
Asphalt and Bitumen	32
Testing of Timber	160
Ageing of Organic Substances	66
Viscosity	40
Fuel, Sampling and Methods of Testing	121
Group D	
Determination of Grain Size in Loose Materials	54
Calibration and Accuracy of Testing Machines	48
Fundamental and Test Relations Between Elasticity and Plasticity, Toughness and Brittleness	34

The papers are published in the language in which they were presented, namely, English, French or German. In addition each paper has a condensed abstract in each of the three languages. An interesting procedure followed in the Proceedings is that at the conclusion of the papers in each of the groups, listed above, there is a general summary of the subject prepared by the presiding officer of the group.

A large number of the papers were presented by American and British authors and in these cases the complete paper is printed in English.

Standards Withdrawn During 1936

On the recommendation of certain standing committees a number of standard and tentative specifications and test methods have been withdrawn during the year. In a number of cases the standards have been replaced by new specifications or tests. It is believed that a list of the various items which have been discontinued would be of service to the members and accordingly the following list has been prepared. Where an item has been replaced by a new standard, this is indicated.

A 33 Methods of Chemical Analysis of Plain Carbon Steel. Replaced by Tentative Methods of Chemical Analysis of Steel, Cast Iron, Open-Hearth Iron and Wrought Iron (E 30 - 36 T).

A 35 Recommended Practice for Annealing of Miscellaneous Rolled and Forged Carbon-Steel Objects.

A 36 Recommended Practice for Heat Treatment of Carbon Steel Castings.

A 37 Recommended Practice for Carburizing and Heat Treatment of Carburized Objects.

A 50 Specifications for Quenched Carbon-Steel Track Bolts. Replaced by Tentative Specifications for Heat-Treated Carbon- and Alloy-Steel Track Bolts (A 183 - 36 T).

A 51 Specifications for Quenched Alloy-Steel Track Bolts. Replaced by Tentative Specifications A 183 - 36 T.

A 71 Specifications for Carbon Tool Steel.

A 92 Specifications for High-Speed Tool Steel.

A 115 Specifications for Alloy Tool Steel.

A 130 Methods of Sampling Rolled and Forged Steel Products for Check Analysis. Replaced by Tentative Methods (E 30 - 36 T).

A 180 Tentative Specifications for Carbon-Steel Castings for Miscellaneous Industrial Uses. Replaced by Tentative Specifications of same title (A 27 - 36 T).

C 66 Tentative Specifications for Sand for Use in Lime Plaster. Replaced by Tentative Specifications for Sand for Use in Plaster (C 35 - 36 T).

C 68 Method of Test for Approximate Apparent Specific Gravity of Fine Aggregate. Replaced by Tentative Methods of Test for Specific Gravity and Absorption of Fine Aggregate (C 128 - 36 T).

C 86 Tentative Method of Test for Apparent Specific Gravity of Coarse Aggregates in a Saturated Condition. Replaced by Tentative Methods of Test for Specific Gravity and Absorption of Coarse Aggregate (C 127 - 36 T).

D 30 Method of Test for Apparent Specific Gravity of Coarse Aggregates. Replaced by Tentative Methods C 127 - 36 T.

D 55 Methods of Test for Apparent Specific Gravity of Sand, Stone and Slug Screenings, and Other Fine Non-Bituminous Highway Materials. Replaced by Tentative Methods C 128 - 36 T.

D 203 Methods of Testing and Tolerances for Electrical Cotton Yarns, Single and Plied. Replaced by General Methods of Testing and Tolerances for Cotton Yarns and Threads (D 180 - 36).

D 221 Method of Test for Water Absorption of Slate. Redesignated C 121 - 31.

D 222 Methods of Flexure Testing of Slate (Modulus of Rupture, Modulus of Elasticity). Redesignated C 120 - 31.

D 247 Definition of the Term Slate. Redesignated C 119 - 27.

D 400 Tentative Specifications for Emulsified Asphalt (Heavy Premix—Winter Grade).

SOCIETY APPOINTMENTS

Announcement is made of the following Society appointments:

D. J. McAdam, National Bureau of Standards, to succeed Louis Jordan as the Bureau's representative on the Joint Research Committee on Effect of Temperature on the Properties of Metals, sponsored jointly by the A.S.T.M. and A.S.M.E.

J. D. Stoddard, The Detroit Testing Laboratory, as the Society's representative on the Sectional Committee on Plumbing Equipment, with P. J. Smith, Technical Assistant, A.S.T.M., as alternate.

J. M. Weiss, Weiss & Downs; M. O. Withey, University of Wisconsin, and M. F. Skinker, Brooklyn Edison Co., on Committee E-6 on Papers and Publications.

F. M. Farmer, Electrical Testing Laboratories, and G. W. Thompson, National Lead Co., on Committee E-8 on Nomenclature and Definitions.

T. S. Fuller, General Electric Co., on Committee E-9 on Research.

H. L. Curtis, National Bureau of Standards, and Cloyd M. Chapman, Consulting Engineer, New York City, on Committee E-10 on Standards.

J. H. Hall, Taylor-Wharton Iron and Steel Co., on the A.S.M. Handbook Committee.

H. H. Morgan, Robert W. Hunt Co., on the Mechanical Standards Committee, a new correlating committee under A.S.A. procedure, with R. E. Hess as alternate.

R. H. Aborn, U. S. Steel Corp., on the Joint Research Committee on Effect of Temperature on the Properties of Metals.

E. E. Howard, Member of Firm, Ash-Howard-Needles & Tammen, to represent the Society at the International Congress on the Building of Bridges and Structures Above Ground, Berlin, October 1 to 8.

H. F. Clemmer, Engineer of Materials, District of Columbia, representing Committee C-9 on Concrete and Concrete Aggregates, and Fred Hubbard, Consulting Engineer, The Standard Slag Co., representing Committee D-4 on Road and Paving Materials, on the Standing Committee on Simplified Practice Recommendation for Coarse Aggregate.

Sam Tour, Vice-President, Lucius Pitkin, Inc., from Committee B-3 on Corrosion of Non-Ferrous Metals and Alloys, and C. E. Heussner, Materials Engineer, Chrysler Corp., from Committee B-6 on Die-Cast Metals and Alloys, on the Joint Committee on Exposure Tests of Plating on the Non-Ferrous Metals.

Something to Talk About

Frequently, members of the Society are asked to present addresses or give short talks on some subject before social or commercial groups of which they are members, such organizations as Kiwanis, Rotary and the like. Some time ago, one of the A.S.T.M. members chose as the subject of his talk before a club, the "American Society for Testing Materials." Since then, several other members have also given talks describing Society work and pointing out its importance and practical applications. They reported that there was a good deal of interest expressed.

While Society work is of a kind that is in one sense difficult to popularize, nevertheless, it can be explained in terms that make the conduct and results of the work perfectly clear to the ordinary non-technical business man. It is acknowledged that A.S.T.M. work in developing quality standards and promoting a better knowledge of materials is of much importance to every business involving materials.

At A.S.T.M. headquarters, there is available a supply of pamphlets and literature which should be of considerable assistance to any member who wishes to speak about the Society's work or the value and significance of standard specifications and tests. This literature will be sent without charge to any of the members who are interested.

NECROLOGY

We announce with regret the death of the following members and representatives:

CHARLES WARD HALL, President, Hall-Aluminum Aircraft Corp., Bristol, Pa. Member since 1911.

GEORGE T. HAMMOND, Consulting Engineer, Brooklyn, N. Y. Member since 1910. Mr. Hammond was a member of Committee C-4 on Clay Pipe for many years, serving as secretary from 1918 to 1923 and as chairman since 1929. He was also a member of Committee C-13 on Concrete Pipe. He was admitted to the bar of New York, although he never practiced law. For 42 years in the service of the city of New York, he designed and supervised the construction of various municipal projects.

JOHN C. HASWELL, President, The Dayton Malleable Iron Co., Dayton, Ohio. Member since 1918. Mr. Haswell was a member of Committee A-7 on Malleable Iron Castings.

NICHOLAS S. HILL, JR., Consulting Engineer, New York City. Mr. Hill was a member of Committee A-3 on Cast Iron.

D. G. MURRAY, Librarian, Government Chemical Laboratory, Australian Chemical Inst., Western Australian Branch, Perth, Western Australia.

JOHN W. PAISLEY, Chief Chemist, Gillespie-Rogers-Pyatt Co., Inc., Jersey City, N. J. Member since 1914. A member for many years of Committee D-1 on Paint, Varnish, Lacquer, and Related Products, Mr. Paisley was chairman of Subcommittees XIII and XXV. He also held membership on Committee D-9 and was a representative of the Society on the Sectional Committee on Electrical Insulating Materials.

CHARLES C. ROBERTS, Chemist, Arthur H. Thomas Co. Member since 1923. Mr. Roberts was a member of Committee E-2 on Spectrographic Analysis.

FREDERICK E. SCHALL, Consulting Bridge Engineer, Lehigh Valley Railroad Co., Bethlehem, Pa. Member since 1908.

J. C. Ramage
1867-1936

J. C. RAMAGE, Engineer of Tests, Southern Railway Co., died at his home, Alexandria, Va., on October 21, after a brief illness. A graduate of Cornell University, he was for a time Materials Inspector, Baltimore & Ohio Railroad, and since 1896 had been in his present position.

Affiliated with the Society since 1904, first as an individual member and later as a representative of his company, he had been a member for many years of several Society committees, serving on Committees A-1 on Steel, A-2 on Wrought Iron and A-3 on Cast Iron for over 20 years, and also a member of Committee A-7 on Malleable Iron Castings and Committee B-2 on Non-Ferrous Metals and Alloys. He had been a member of Committee D-1 on Paint, Varnish, Lacquer, and Related Products since 1911, and was also a member of Committee D-8 on Bituminous Waterproofing and Roofing Materials. From 1932 to 1934 Mr. Ramage served as a member of the A.S.T.M. Executive Committee.

He is survived by his widow, two daughters and a son. In his death the Society loses an active supporter and his hosts of friends in A.S.T.M. will miss his kind and pleasing personality.

British Publication on Petroleum Technology

THE Institution of Petroleum Technologists, Aldine House, Bedford St., London, W. C. 2, has published a volume, "Petroleum Technology 1935." This presents a summary of developments in petroleum technology during 1935, and gives some 2000 references to books, abstracts, etc., published during the year. The book is a series of progress reports in which each aspect of the industry is reviewed by an authority. There are sections on chemical and physical refining, cracking, engines, lubricants, road materials, testing, chemistry, etc.

Copies of the book in cloth binding may be ordered from the I.P.T. offices. The price, postage prepaid, is 8 s.

PERSONALS

. . . News items concerning the activities of our members will be welcomed for inclusion in this column.

F. S. COOK, since 1919 Vice-President and Secretary of the McCraken-Ripley Co., Portland, Ore., has been appointed Pacific Coast Manager, Robert W. Hunt Co., with headquarters at San Francisco.

B. S. SMITH, who was President, Pennsylvania-Dixie Cement Corp., New York City, is now President, Universal Atlas Cement Co., Chicago, Ill. He succeeds B. F. AFFLECK, who has retired after a long period of service with this company.

R. F. COHN, formerly Secretary and Factory Manager, Reynolds Wire Co., Dixon, Ill., is now Assistant to the President, Pines Winterfront Co., Chicago, Ill.

FRANK PIERACCINI is now connected with Stauffer-Dobbie, Ltd., Galt, Ontario, Canada. He was formerly Superintendent, The Tire Fabric Corp., Salmon Falls, N. H.

J. V. EMMONS, Metallurgist, Cleveland Twist Drill Co., Cleveland, Ohio, has been granted the professional degree of Metallurgical Engineer by the Case School of Applied Science, for his work on molybdenum-tungsten high-speed steels.

W. A. JONES, formerly Secretary, Bituminous Coal Code Authority, Eastern Subdivision of Division No. 1, Altoona, Pa., is now Secretary, Central Pennsylvania Coal Producers' Assn., Altoona, Pa.

L. B. MANLEY is now Principal Assistant Engineer, Department of City Transit, Philadelphia, Pa. He was Office Engineer, Delaware River Joint Commission, Camden, N. J.

R. E. HALL, Director, Hall Laboratories, Inc., Pittsburgh, has received the honorary degree of Doctor of Science from Ohio Wesleyan University.

LYMAN QUINCY, former Vice-President and General Manager, The Quaker Mineral Spirits Co., Philadelphia, is now with the Hercules Powder Co., Experimental Station, Wilmington, Del.

H. J. SHEARD is now connected with the Bayou State Oil Corp., Hosston, La. He was Chief Chemist, Crown Central Petroleum Corp., Houston, Texas.

J. T. MACKENZIE, Chief Chemist, American Cast Iron Pipe Co., Birmingham, Ala., has been appointed chairman of the Gray Iron Division of the American Foundrymen's Assn., and G. P. PHILLIPS, Metallurgist, International Harvester Co., Chicago, Ill., vice-chairman. Doctor MacKenzie succeeds HYMAN BORNSTEIN, Director of Laboratories, Deere & Co., Moline, Ill., who resigned to accept the vice-presidency of A.F.A. after several years of outstanding leadership of the Gray Iron Division activities.

ROBERT LINTON, Consulting Engineer, Los Angeles, Calif., has been appointed member of the State Mining Board of California.

O. T. KREUSSER, formerly Director, Museum of Science and Industry, Chicago, Ill., is now connected with the Research Laboratories, General Motors Corp., Detroit, Mich.

W. J. SWEENEY is now Associate Director, Esso Laboratories, Elizabeth, N. J. He was formerly Director, Development and Research Laboratory, Standard Oil Co. of Louisiana, North Baton Rouge, La.

R. P. HEUER, Director of Research, General Refractories Co., Philadelphia, has been elected a director of that company.

I. R. PENA, formerly Chief Chemist, Central Constancia, Toa Baja, Puerto Rico, is now Instructor in Chemistry, University of Puerto Rico, College of Agriculture, Mayaguez, Puerto Rico.

R. E. WILKIN is now Assistant Sales Mgr., Organic Products Hooker Electrochemical Co., New York City. He was Manager, Technical Dept., Standard Oil Co. (Indiana), Chicago, Ill.

I. D. HAGAR, Eastern Sales Manager, Titanium Pigment Co., Inc., New York City, was recently elected to the board of directors of this company.

C. A. ADAMS, formerly Professor of Engineering, Emeritus, and Consulting Engineer, Harvard University, Cambridge, Mass., is now Consulting Engineer, Edward G. Budd Manufacturing Co., Philadelphia, Pa.

A. R. ELLIS, formerly Vice-President and General Manager, Pittsburgh Testing Laboratory, has been elected President of that organization.

W. H. ATKINSON, who was Chemical Engineer, Asbestos Manufacturing Co., Huntington, Ind., is now Assistant Superintendent in Charge of Materials and Processing.

NEW MEMBERS TO OCTOBER 15, 1936

The following 78 members were elected from July 21 to October 15, 1936:

Company Members (22)

ASSOCIATED WOOL INDUSTRIES, E. C. Morse, 386 Fourth Ave., New York City.

BITUCOTE PRODUCTS CO., A. J. Day, Chief Chemist, 1411 Central Industrial Drive, St. Louis, Mo.

BOISE GAS LIGHT AND COKE CO., R. C. Young, Manager, 715 Bannock St., Boise, Idaho.

BURLINGTON STEEL CO., LTD., Neil Metcalf, Metallurgist, Sherman Ave. North, Hamilton, Ont., Canada.

COLUMBIAN ROPE CO., J. B. Reber, Vice-President, 309 Genesee St., Auburn, N. Y.

ISTITUTO SPERIMENTALE STRADALE, Italo Vandone, Director of Laboratory, via Mangiagalli 14, Milan, Italy.

KREBS ELECTRIC AND MANUFACTURING CO., INC., Rudolph Krebs, President, 206 Lafayette St., New York City.

LENAPE HYDRAULIC PRESSING AND FORGING CO., R. M. Hanny, Chief Engineer, Box 536, West Chester, Pa.

MANY CORP., BEN J., Ben J. Many, President, 201 N. Wells Ave., Chicago, Ill.

MISSISSIPPI TESTING LABORATORIES, E. E. Elmer, Manager, 121 S. Roach St., Jackson, Miss.

NAYLOR PIPE CO., R. K. Ashton, Assistant to President, 1230 E. Ninety-second St., Chicago, Ill.

OSHKOSH INDUSTRIAL LABORATORY, J. O. Frank, Vice-President, 159 W. Irving St., Oshkosh, Wis.

PAWTUCKET MANUFACTURING CO., William Povey, Superintendent, 327 Pine St., Pawtucket, R. I.

PRECISION CASTINGS CO., INC., F. A. Porter, Metallurgist, Syracuse, N. Y.

REYNOLDS WIRE CO., J. G. Ralston, President, Dixon, Ill.

SALEM ENGINEERING CO., R. R. La Pelle, Sales Engineer, Salem, Ohio.

SHORE INSTRUMENT AND MANUFACTURING CO., INC., The, William F. Shore, President, 9025 Van Wyck Ave., Jamaica, N. Y.

SPAULDING FIBRE CO., INC., H. C. Steadman, Factory Engineer, Tonawanda, N. Y.

TEXAS MINING AND SMELTING CO., H. P. Henderson, President, Box 780, Laredo, Tex.

TRUBENIZING PROCESS CORP., B. Liebovitz, President, 350 Fifth Ave., New York City.

YALE & TOWNE MANUFACTURING CO., The, R. E. Hicks, Chief Chemist, 230 Henry St., Stamford, Conn.

ZEIDLER CONCRETE PRODUCTS MACHINERY CO., C. A. Bluedorn, Engineer, Box 2461, Waterloo, Iowa.

Individual and Other Members (49)

ALLISON, F. H., JR., Metallurgist, United Engineering and Foundry Co., Vandergrift, Pa.

BERKEY, D. K., Physicist, Beech-Nut Packing Co., Canajoharie, N. Y.

BIBBER, L. C., Welding Engineer, Carnegie-Illinois Steel Corp., Carnegie Building, Pittsburgh, Pa.

BIDDENBACK, A. B., Assistant Metallurgist, U. S. Navy Dept., Engineering Laboratory, Building 101, Navy Yard, Mare Island, Calif.

BOUVIER, G. B., Director of Engineering, Minneapolis-Honeywell Regulator Co., 2747 Fourth Ave. S., Minneapolis, Minn.

BRENNER, BERT, Research Chemist, Sigmund Cohn, 44 Gold St., New York City.

BROGDEN, A. L., Turpentine and Rosin Factors, Inc., 814 Atlantic National Bank Bldg., Jacksonville, Fla.

CANNON, A. R., Treasurer, Oliver B. Cannon and Son, Inc., 1701 S. Fifty-fourth St., Philadelphia, Pa.

CARROLL, W. C., Specification Dept., Republic Steel Corp., 1401 Republic Building, Cleveland, Ohio.

CATES, C. GRADY, Sales Manager and Engineer, Stone-Tile and Supply Co., Cleveland Ave. and Eighteenth St., S. W., Roanoke, Va.

CONNECTICUT STATE COLLEGE LIBRARY, Storrs, Conn.

COOK, F. S., Pacific Coast Manager, Robert W. Hunt Co., 251 Kearny St., San Francisco, Calif.

CUMMINGS, A. E., District Manager, Raymond Concrete Pile Co., Room 1912, 111 W. Monroe St., Chicago, Ill.

DORN, C. W., Director of Research and Testing Laboratories, J. C. Penney Co., 330 W. Thirty-fourth St., New York City.

DRESHFIELD, A. C., Technical Director, Paper Makers Chemical Corp., Box 864, Kalamazoo, Mich.

DRYDEN, W. B., Chemical Engineer, Duquesne Light Co., 435 Sixth Ave., Pittsburgh, Pa.

EGYPTIAN UNIVERSITY, FACULTY OF ENGINEERING, Madaress St. Giza B., Egypt.

ENGEL, R. A., Chief Engineer, Fisher Governor Co., Box 223, Marshalltown, Iowa.

FAXON, H. C., Engineer in Charge of Appliance Section, The Borneo Co., Ltd., Mercantile Bank Building, Singapore, Straits Settlements.

FISHBURN, C. C., Associate Materials Testing Engineer, National Bureau of Standards, Washington, D. C.

GILMORE, B. H., Hall Laboratories, Inc., Pittsburgh, Pa. For mail: Mellon Institute of Industrial Research, Pittsburgh, Pa.

GROFF, J. S., Chief Chemist, U. S. Naval Torpedo Station, Newport, R. I.

GUADALAJARA, M., Chief of Petroleum Inspectors, Ministerio de Fomento, Government of Venezuela, Apartado 48, Maracaibo, Venezuela.

GUTH, D. O., Development Engineer, Victor Manufacturing and Gasket Co., 5750 W. Roosevelt Road, Chicago, Ill.

HART, RALPH, President and Treasurer, Hart Products Corp., 1440 Broadway, New York City.

HORNER, W. W., Consulting Engineer, 1325 International Office Building, St. Louis, Mo.

KICHERER, H. J., Works Manager, American Hoist and Derrick Co., 63 S. Robert St., St. Paul, Minn.

LANGDALE, HARLEY, President, American Turpentine Farmers Assn., Strickland Building, Valdosta, Ga.

LEE, A. P., Vice-President, W. C. Hardesty Co., Inc., Box 250, Dover, Ohio.

LOGUE, PAUL, In Charge of Operations, Swann and Co., 2808 Hasting Road, Birmingham, Ala.

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT, S. R. Mitchell, Testing Engineer, 205 S. Broadway, Los Angeles, Calif.

MANHATTAN COLLEGE, Brother Amandus Leo, Dean of Engineering, Spuyten Duyvil Parkway, Bronx, New York City.

MCDERMOND, C. C., Inspector, E. W. Saybolt and Co., New York City. For mail: Apartado 331, Maracaibo, Venezuela.

MULLIGAN, J. A., Consultant on Brick Masonry and Masonry Materials, 341 Madison Ave., New York City.

O'NEILL, O. M., Chief Chemist, Niagara Alkali Co., Buffalo Ave., Niagara Falls, N. Y.

OSGOOD, W. R., Materials Engineer, National Bureau of Standards, Washington, D. C.

OTERO, A. G., Director, Laboratorio Nacional, Apartado 362, Caracas, Venezuela.

PURCHAS, R. W. T., Supervisor of Purchasing, Middle West Service Co., 20 N. Wacker Drive, Chicago, Ill.

ROCHESTER PUBLIC LIBRARY, John A. Lowe, Director of Libraries, 115 South Ave., Rochester, N. Y.

RUBLOFF, E. B., Consulting Chemist, Ohio Valley Testing Laboratory, 304 Zweig Building, Bellaire, Ohio.

RUEHFEL, GEORGE, Sole Owner, George Ruehfel Co., 778 Woodward Ave., Brooklyn, N. Y.

SAN FRANCISCO, CITY AND COUNTY OF, BUREAU OF ENGINEERING, PUBLIC UTILITIES COMMISSION, L. T. McAfee, 425 Mason St., San Francisco, Calif.

SMITH, E. W. P., Consulting Engineer, Lincoln Electric Co., 12818 Coit Ave., Cleveland, Ohio.

SNYDER, J. L. K., Director of General Sales Division, Merck and Co., Inc., Typing Service Dept., Rahway, N. J.

THOMSSEN, E. G., Chief Chemist, The J. R. Watkins Co., 306 Center St., Winona, Minn.

TUCKER, J. LER., Textile Engineer and Consultant, Owens-Illinois Glass Co., Industrial Materials Laboratory, Newark, Ohio.

WHITE, A. J., President, Universal Chemists Corp., 263 Northampton St., Boston, Mass.

WHITLOCK, MARY C., Assistant Professor, University of Illinois, Urbana, Ill.

WILSON, B. L., Associate Physicist, National Bureau of Standards, Washington, D. C.

Junior Members (7)

ACKERLIND, ERIK, Research Fellow, Dielectric Testing, Polytechnic Institute of Brooklyn, Brooklyn, N. Y. For mail: Box 151, Main P. O., Brooklyn, N. Y.

ALTEMUS, C. S., Chemist, Raw Material Control, Standard Varnish Works, Elm Park, Staten Island, N. Y. For mail: 85 Beech St., East Orange, N. J.

BARNETT, O. T., Metallurgist, Black, Sivalls & Bryson, Inc., 2131 Westwood Boulevard, Oklahoma City, Okla.

DREWE, R. B., Technical Liaison Officer, Dunlop Perdriau Rubber Co., Ltd., Melbourne, Victoria, Australia. For mail: 42 Stanhope St., Malvern, Victoria, Australia.

HENTSCHEL, R. A. A., Research Dept., Remington Arms Co., Inc., Bridgeport, Conn.

LEVIN, JOE, Junior Chemist, Silverstein & Pinsof, Inc., 1125 W. Fourteenth St., Chicago, Ill.

SCHEER, H. G., Operating Engineer, Loew's Theatres, 1022 Main St., Houston, Tex.